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# ECONOMIC CONDITIONS IN MEDICINE*

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*Vancouver*

LAST year, by decree of the Executive Committee of the Canadian Medical Association, a change was made by which the Presidential address should be a valedictory and not an inaugural presentation as in past years. The advantages of such a change will be obvious to all. A year's experience in office should acquaint the President with the nature and scope of the Association's activities and assist him in arriving at some useful conclusions as to future policies in the best interests of the medical profession of Canada. I appreciate most highly the privilege and honour of serving as your President and wish to express my sincere thanks for the courtesy and cooperation which I have received from my colleagues during the past two years. It has been an inspiration and constant stimulus to me during my term of office.

If I were not fully convinced that the major problem of the medical profession to-day is economic, I would hesitate to again make this the main theme of a Presidential address. This subject has already been most ably presented on two occasions by my immediate predecessor in office. The Presidential addresses of the British Medical Association, 1930, and the Canadian Medical Association, 1931, also of the American Medical Association, 1930, were almost entirely presentations of the economic problems of the profession, but the subject is of such importance and so constantly undergoing flux and change that I need offer no apology for its further discussion.

It has been stated that "The one great outstanding problem before the medical profession to-day is that involved in the delivery of adequate, scientific medical service to all the people, rich and poor, at a cost which can be reasonably met by them in their respective stations in life." The truth of this statement cannot be gainsaid, but it must be obvious to all that to give this ideal practical effect is possible only with State or Government assistance. Nor must we lose sight of the fact that the interests of the general public in these problems and their solutions outweigh even the interests of the medical profession. The satisfactory adjustment or solution of the big social problem of medical care is possible only by collective cooperative action between the public and the profession. On every hand organized medicine is bestirring itself, by investigations and surveys, to obtain facts that will aid them in solving this problem. I urge that every one of our profession, especially its younger members, should endeavour to inform himself on this subject, so that when the time comes for a decision it may be made wisely.

The British Medical Association presented on April 26th, 1930, a proposal for "A Complete Health Service to the Whole Nation." These proposals of our British confrères should be known and understood by every one interested in the welfare of the Canadian profession, as the principles laid down in Britain are almost equally applicable in Canada.

In the United States the Commission on the Cost of Medical Care, composed of both medical members and laymen, has been conducting since 1928 an intensive survey of this question. At the outset the Commission laid out a plan covering five years of work, and it is expected that this work will be completed during the present

* The presidential address delivered on the occasion of the Sixty-third Annual Meeting of the Canadian Medical Association, Toronto, June, 1932.

year and a final report made. However, after the first three years' study, Dr. Ray Lyman Wilbur, the Chairman, proposed certain fundamental principles, which, after discussion, were adopted.

1. THE PERSONAL RELATION BETWEEN PHYSICIAN AND PATIENT MUST BE PRESERVED IN ANY EFFECTIVE SYSTEM OF MEDICAL SERVICE

Medical service is, and, doubtless by its very nature, must remain a distinctly personal service. Even in this age of standardized commodities for the table, ready-to-wear clothing, and inter-changeable spare parts for all types of machines, there has been no plan suggested for the reduction of medical diagnosis and treatment to basic units which can be ordered from traveling salesmen or acquired through correspondence courses. The physician must see his patient and see him in many cases over an extended period of time if the diagnosis and treatment are to achieve the greatest possible accuracy and efficiency. There is no substitute for personal observation.

Man is not a standardized machine and each individual reacts to the conditions of life in a manner in some respects unique. In the treatment of disease, this individual variation is a factor of great significance and can receive due consideration only when the practitioner has known the patient for a considerable time and maintains a personal relation with the patient.

2. THE CONCEPT OF MEDICAL SERVICE OF THE COMMUNITY SHOULD INCLUDE A SYSTEMATIC AND INTENSIVE USE OF PREVENTIVE MEASURES IN PRIVATE PRACTICE AND EFFECTIVE SUPPORT OF PREVENTIVE MEASURES IN PUBLIC HEALTH WORK

The cost of adequate curative treatment is now high and may continue to increase as expensive procedures resulting from scientific progress become more widely used. Sickness, in addition, involves other personal and social costs, some of which cannot be measured in monetary terms.

3. THE MEDICAL SERVICE OF A COMMUNITY SHOULD INCLUDE THE NECESSARY FACILITIES FOR ADEQUATE DIAGNOSIS AND TREATMENT

We cannot be content with anything except the best possible service that modern science can provide and it is therefore imperative that modern scientific equipment for the diagnosis and treatment of disease be available to the practitioners of medicine in every community.

International studies on the relation between "Private and Official Practice of Medicine," with special reference to the prevention of disease, now being conducted for the Milbank Memorial Fund by Sir Arthur Newsholme, deal with Britain and Continental Europe and give in concise form much valuable information regarding practice abroad. In this connection we may learn much from France, which was one of the last European countries to adopt compulsory sickness insurance (April, 1928). Dr. J. C. G. Dickinson, (*The Lancet*, 1931, **2**: 868) comments as follows:

"The French doctors have shown that, placing the moral and material welfare of the patient first, they are irresistible to the onslaughts of any political party. They did not employ the threat of a strike, but simply that of a combined front—solidarity of the profession with the threat of non-cooperation with any political party which opposed their just and necessary claims."

The concluding reports of these two surveys will no doubt be received by the profession and the public the world over with keenest interest, and an important recent study by Michael M. Davis, Director for Medical Services for the Julius Rosenwald Fund, should also be read by all who are interested in medical economics.

During the last twenty months we have lived in the very atmosphere of a "depression" which is world-wide and from which Canada has not been exempt. Such facts as unemployment, socialism, communism, deflation, inflation, paternalism, economics, etc., have been dinned into our ears, until even the children at school are familiar with them and understand something of their significance. With the industrial revolution of the last three decades there has been also a vast change in the methods and practice of medicine. The collapse of the financial, industrial and economic structure has brought with it most momentous problems for our profession. The striking advance in industry, due to invention and mechanical development, with mass-production and resultant low costs, has had its parallel in a scientific advance in the realm of medicine which has brought incalculable benefit to mankind. But here the comparison ends. The achievement of industry generally has been in its practical aspects, the lowering of costs of production and the resultant lowering of the sale price to the consumer. Medicine, with an equally fine record in scientific achievement, has been unable, on account of certain fundamental difficulties to be discussed later, to reduce the cost to itself of its produce—medical service—and so has been unable to reduce the cost to the patient.

Of our whole population the part that is able to pay private practice rates is probably not above 25 per cent; the part able to pay on a sliding scale, revision downwards, or what might be termed part-payment, is about 35 per cent. The remaining 40 per cent, especially in times of stress, are not in a position to pay anything. It is this 40 per cent particularly that constitutes the problem of the medical profession to-day. Under our present system these receive medical service at the hands of private physicians, acting as individuals; also

from public clinics and hospitals receiving State aid; also through the ever-expanding agencies of State-controlled organizations such as Tuberculosis Clinics, Sanatoria, Venereal Disease Treatment Centres, Baby Clinics, etc. In order to better understand our problems let us examine for a moment the cost factors entering into medical service to-day as compared with those of a generation ago.

*The cost of diagnosis* has vastly increased during the past three decades, due to scientific progress. The imperative use of x-ray and other laboratory and technical facilities has added to the cost of diagnostic service and made it more difficult for the individual private physician to sell his product of professional skill.

*The cost of medical education* has increased tremendously, until to-day it ranges from ten to fifteen thousand dollars in cash, and ten years in time. A generation ago three to four thousand dollars in cash and five or six years in time sufficed to carry a young man through college and out into practice.

*The cost in "overhead"* has increased also. To-day it is 35 to 50 per cent of gross receipts. Thirty years ago it was 10 to 15 per cent.

*The proportion of unpaid work* is also increasing. Ten years ago, from a careful survey made in British Columbia, it was estimated that the average of unpaid accounts amounted to 35 per cent of all work done. This was used as a basis in establishing fees for work done in Workmen's Compensation Board cases. Now the burden on the medical man has further increased until careful inquiries among general practitioners show unpaid work ranging from 45 to as high as 75 per cent.

Time does not permit of a detailed analysis of these factors nor for suggestions as to how physicians could improve some of them by co-operative laboratory services, cooperative offices, elimination of waste, and better business methods.

What of the patients? Have they any real problems? Let us consider first that part of the population which we may call the "middle class"—the people of moderate, medium-sized incomes, ranging from $2,000 to $5,000 per family. It was this section of the community in days past that formed the solid basis of the practitioner's paying practice—meeting their medical bills practically 100 per cent. For an illness of short duration, involving no major surgery or hospitalization, this class can still meet their obligations without undue stress, but any burden beyond this gives rise to a serious financial problem in most families. This is probably the principal reason why so many of the lower and medium income classes are to-day seeking medical service at the numerous public and tax-supported hospitals. In one of our large western cities the volume of work in the free clinic service has increased from 7,500 in 1929 to about 30,000 in 1931—an increase of 400 per cent. This hospital cares for all classes in the community, rich and poor, so that a cross section of its admissions should indicate with fair accuracy the proportions of pay and non-pay cases. There has been a steady increase during the past few years in the numbers of non-pay patients, until to-day they amount to about 60 per cent of all admissions.

Let us hear what Michael M. Davis, the economist, has to say on the subject of "ability to pay."

1. The ability of a person or of a family to pay for medical care is determined not merely by income alone but by the relations between resources, responsibilities, and the expense of the medical service which is required.

2. The ability to pay for medical care is not a fixed status of an individual or a family but varies with time and occasion. A family's ability to pay will vary, for instance, with the number, age and employability of the children. The ability to pay for a minor illness is not the same as ability to pay for a long-continued one, or for a major surgical operation.

3. The income of the population is very unevenly distributed. Less than one-tenth of 1 per cent of the 45,000,000 persons gainfully employed in the United States receive incomes of over $10,000. Barely 2 per cent have incomes of over $5,000, and less than 20 per cent incomes of over $2,000. Professor Irving Fisher, of Yale, wrote in the autumn of 1927:

"In the income calculations of 1926, our most prosperous year, the members of the two lowest income groups (comprising 80 per cent of the population) would receive 47.5 billion dollars, out of 90 billion income from the nation, that is, about $510 per capita. The 'poorest' class alone, comprising 76,000,000 people (65 per cent of the total) receive about 38.6 per cent of the national income, or $34,740,000,000—less than $460 per person. This class includes not only manual and office workers, but the small business men, many managers, and most engineers, as well."

4. Only a small fraction of the people in the United States are "indigent". The great majority have only small margins over the current necessities of self-support. A small fraction have substantial and a minute proportion have ample margins.

5. The expense of caring for an illness depends on the illness, and varies from a few dollars to a thousand dollars, or more, omitting luxury levels.

6. The incidence of illness is uncertain. No one can tell when it will occur, or whether it will occur within a given year, or whether it will occur at all.

7. The expense of illness, assuming that it does occur, cannot be estimated in advance.

8. The incidence of illness is highly uneven. More than half of the total annual expense for the care of illness falls upon less than one-fifth of the population. In any given year 15 to 20 per cent of all families face high-cost sickness. No one can tell in advance whether this burden will fall on his particular family.

9. The ability to pay for medical care can be and has been scientifically studied by demonstrated methods.

10. A number of such studies show that the great majority of the population pay, and can pay, only very moderate amounts for the care of sickness.

11. Expenditures for medical care increase in proportion with income, indicating that the readiness of people to pay increases along with their ability.

12. A series of similar studies shows that of the persons who seek charitable medical service at hospitals and clinics a very small proportion, rarely over 4 per cent, can afford to pay at private rates for the care which they require.

13. The "people of moderate means," constitute approximately the 15 per cent of the population who are economically below the well-to-do and above the mass of wage-earners and can meet the expense of ordinary or minor illness. Their outstanding problem is the high-cost illness.

14. For the mass of wage-earners illness brings not only the expense of caring for it but loss of income whenever an employed person is ill.

15. Because its occurrence is uncertain, its incidence uneven, and its expense highly variable, sickness cannot be budgeted in advance as can the regularly recurring expenditures of a family.

16. A particular individual or family cannot budget against the hazard of sickness, but a certain sum might be specified which would provide for sickness among all the members of a group if pooled for these individuals over a period of time.

At this juncture we may well ask ourselves several questions. Are there too many doctors for the population served, particularly in the large towns and urban centres? It would seem so, when we consider the ever-increasing scope and volume of public health activities, both preventive and curative, which have materially reduced the field of private practice. Are there too many specialists? Specialism in medicine seems still to be proceeding at an accelerating rate. A report (1928) by Dean Weiskotten, of Syracuse, indicates that out of 1,947 medical graduates of all the chief medical schools of the country of the year 1920, one-half would have confined their practice to a specialty within eleven years of graduation. What influence has this increasing trend towards specialism on the increasing costs of medical service to those who do pay and how much is it responsible for the increase of that increasing proportion of the public who say they find it impossible to pay anything? These are questions that should receive the serious consideration of our profession as well as of our medical schools and hospitals.

Should medical ethics and obligations be revised? It would seem appropriate at this time to survey our past, present, and future, with the object of casting aside that which is outworn and obsolete, adhering to that which experience has shown as valuable, and, lastly, adopting such new policies as may seem sound and in the best interests of all concerned. The time has arrived when the profession should proclaim a new credo regarding the so-called "charity patient." In this respect we have inherited a tradition. Hospitals were founded originally as places of refuge for the indigent poor and sick. Many of them were originally monasteries and the care of the sick devolved upon the members of the monastic orders. As time went on, the onus of care passed to the physicians and the medical profession inherited the traditional, ethical and moral obligations of their predecessors with regard to the care of the indigent sick. This was their Christian duty, and the public so regarded it. This idea still holds with some medical men, and a large element of the public, long accustomed to such charity, look upon it as a right. In this connection, let me quote from a report of the Commission on the Costs of Medical Care:

> Finally there is the custom among physicians of doing a great deal of free work, with the consequent need of charging higher fees for patients who do pay. This is one of the strange traditional relics of antique customs. Why physicians practice charity towards those unfortunate people who belong to the whole community is beyond the understanding of anyone, except a doctor who has been accustomed to it and the people who have been taking it for granted. Nobody else does it; and yet we go on, with these complicated economic conditions, at a time when the conditions in every direction are compelling us to consider economics as never before. We have on the one hand much talk regarding the high cost of medical service and on the other hand many people who fail to pay their hospital and medical bills promptly if at all. It would be possible to improve this chaotic situation very much if the whole business were handled intelligently.

Another authority has this to say:

> The public also realize that a tradition of charity which may have been appropriate fifty or sixty years ago has been carried over into new and very different conditions. The continuation of this charity principle to-day is unsound and the profession should formulate clearly the terms upon which all non-pay medical service shall in the future be carried on. That charity is often generously and even gladly given is beside the point. It is not well that the medical service of the people should stand upon a pavement of good intentions.

In this connection we note the large and ever increasing amount of unpaid time given by physicians in outdoor clinics as well as to the indoor bed cases. In teaching hospitals connected with medical schools, where this work is in charge of the university staff, such free ser-

vice no doubt is necessary, but in the non-teaching hospitals the direct and indirect compensation to the staff physician is becoming less and less commensurate with the demands made upon him for the time and attention given. There is a growing opinion that money payment for such services is necessary both in the interests of efficient service to patients and in fairness to the medical man.

Looking over the field to-day we see a general groping on the part of the state, the hospital, the public, and the doctors for information and light that will lead to a satisfactory solution of their problems. The medical profession everywhere is awakening to the realization that there are economic problems to be solved. They are becoming less individualistic in their outlook and more socially minded, and are thinking and acting in terms of groups rather than of individuals. A number of interesting experiments are under way in various parts of the country. The work of the Academy of Medicine of Toledo and Lucas County, Ohio, in dealing with their problems is of value, as it indicates what the profession can do when working unitedly and making a sincere endeavour to solve its problems. As one of their various activities they maintain a committee called the Dispensary, Free Clinic and Social Service Committee, which works in close collaboration with the representatives of the various social agencies of the city. Through this a check is kept on admissions to free dispensaries, the basis being the family budget upon an agreed schedule. More recently there has been a similar movement on the part of the physicians of Tacoma in incorporating a Business and Service Bureau for its members. Briefly, the situation in Pierce County, which has Tacoma as its chief centre, was as follows.

Two private clinics practically monopolized 95 per cent of all the Workmen's Compensation practice involving some 10,000 men, the rest of the profession getting little or none of it. In addition, many of these industrial concerns had a voluntary sickness service which, naturally, went to the physicians doing the compensation work. There was much general dissatisfaction among the doctors also with regard to unsatisfactory collections of patients' accounts, many of whom it was believed could pay much more fully and promptly if they would. It was decided, therefore, to incorporate, and the Physicians' and Dentists' Business Bureau was the result, which is under the managership of a university graduate in economics. The primary object of this organization is the collection of accounts. A subsidiary is the Pierce County Industrial Medical and Surgical Service Bureau, Inc. The objective of this part of the organization is to enter into contracts with industrial firms to do their compensation accident work and also to make contracts on behalf of their members to take over the ordinary sickness work where it has been carried out on a contract basis. This is one of the most interesting experiments that has come to my notice and indicates what the profession can do for itself if it will study its problems and make a determined effort to solve them.

Organized medicine in Canada, as represented by the Canadian Medical Association, is intensely interested in these questions. A year ago at the Vancouver meeting, the Council recommended "that the Association take steps to form, in connection with its Committees on Economics and Public Health, a strong, and carefully selected study group which shall consider the question of Health Insurance, and shall examine into all voluntary and compulsory schemes and be prepared to submit constructive proposals to the Association." Later in the year, Dr. W. Harvey Smith, of Winnipeg, was made Chairman of this special committee and the members are to be congratulated on the very excellent and wise choice made by the Executive Committee.

As is well known to all of us, under the British North America Act, health matters fall within the sphere of the provinces and the federal government is debarred from initiating any legislation in this connection that will interfere with provincial rights. On this account, it was intended that the Committee on Medical Economics should function as a central bureau of information to serve all the provinces, and to guide and advise when problems arose in any of them; also, by virtue of its nation-wide scope, to exercise a steadying and determining influence upon all economic matters that may be applicable to the Canadian profession as a whole. However, in the meantime, events have been marching on—and the demand on the part of the public for relief has resulted in concrete action in the legislatures of the prairie provinces. What is known as the

"Municipal Doctors' Plan" has been put into effect in Saskatchewan to a considerable degree and, less so, in the two adjacent provinces. This plan might be termed "Compulsory Health Insurance by Local Option." The adoption or rejection of this relief measure lies entirely with the taxpayers of the municipality, and a majority vote decides the question. Also, they determine the scope of the service desired and for which they are willing to pay. While reports from competent observers regarding the working of the scheme are generally favourable and it would appear that in these provinces a satisfactory solution for some of their medical service problems in rural districts has been found, yet serious difficulties, reacting unfairly on the local practitioner already established, have arisen in certain municipalities where this system was adopted. Amendments to the Municipal Act recently passed by the Manitoba Legislature, it is believed, will eventually safeguard the medical man in future contracts of this nature.

The medical profession of Manitoba has, for some years, been actively engaged in a study of the health problems of that province. Following the introduction in March, 1931, of what is known as the Pratt resolution in the Provincial House, a select committee was appointed to inquire into the matters mentioned in the resolution and their report has been presented. The committee recommends that a commission be appointed by the Lieutenant-Governor in Council to consider the health needs of the province as a whole and to formulate a plan on a sound actuarial basis whereby health service will be available to every resident of the province at a reasonable cost which should be provided for in advance and distributed equitably; that in the formation of any plan for provincial health service the feasibility of municipalization in rural areas and health insurance in urban areas be considered; and that as far as possible the right of a district to choose its type of local health service and the right of the individual to choose his physician be recognized.

During the past fifty years, British Columbia has witnessed the growth and development of many voluntary medical service societies in connection with its varied mining, milling, transportation and other industries. These societies are based essentially on the insurance principle. They are voluntary so far as any one industry is concerned, but membership is compulsory, once the particular society is formed. They operate under certain advantages. Their overhead is very low. The company deducts the assessment from the payroll and hands it over to the employees' organization without charge for this service. The worker or member of the society bears the entire cost of the service, there being no contributory assistance from either the employer or the state. The service given in most cases is a complete one—medical, surgical and hospitalization for the member, and a very large measure of similar service to the dependents. One such society, long established, with a membership range that is province-wide, has spent on its medical service in fifteen years in round figures, $1,700,000. With the exception of 3.72 per cent for administration and 1.56 per cent for reserve, the entire amount has been applied to medical service proper. There are some 7,000 employees and a slightly greater number of dependents, making in all 14,000 to 15,000 persons under protection.

Many of you who are interested and giving serious thought to these problems are no doubt familiar with the survey of the Endicott Johnson Workers Medical Service (1928), which, to my mind, is one of the best of such studies yet made. Here we have some 15,000 workers and 25,000 dependents making, in round figures, 40,000 persons.

To compare the two plans just outlined is impossible unless we have similar data from each. However, a very cursory examination shows that the cost of the Endicott Johnson Company per annum, per person served, was in round figures double that of the British Columbia concern. Time does not permit of a full analysis, but the difference in the per per capita cost is largely accounted for by the difference in the range of services given by the respective organizations—a striking illustration of the truth that in this world we generally get what we are willing to pay for.

It can be said of such plans that they have been, and are, of immense benefit to the people they serve. For $1.75 per month an entire family is protected against the costs of sickness and hospital care. It can be said also that medical men generally find that such employ-

ment is desirable, as the salary received, although small in most cases in proportion to the work done, forms the foundation of their financial budget. It is sure; it may perhaps carry their "overhead." As all the men engaged in this work carry on private practices as well, the cash returns from the latter usually represents their net incomes.

There are, however, undesirable features to these organizations, both from the point of view of the insured and of the medical profession also. The medical work is not spread throughout the profession. The executive of the employees' organizations appoint certain medical men and the insured members are required to confine themselves, when seeking medical attention, to these appointees. In general, this causes little or no dissatisfaction on the part of the insured, probably because taking them as a whole, the medical men engaged in this work show a high average of professional ability. In this connection it is interesting to note the Milbank report (see Borough of Swindon, volume 3, page 336). Again, the rate at which medical and surgical services are paid for is too low. An analysis in detail of the service rendered and the remuneration paid will readily demonstrate the truth of this. The rate of assessment is too low. Full rates are paid for hospital and drug services, and, of necessity, the doctor has to accept what remains. This condition of affairs should be susceptible of satisfactory adjustment through negotiation between the medical men acting together as an organization on the one hand, and the insured, through their organization, on the other.

Probably the success of these voluntary insurance schemes prompted the Provincial Government, nearly three years ago, to appoint a Royal Commission to investigate and report on the advisability of a health insurance scheme for the province. The report of the Commission which is now available will no doubt be fully discussed during the coming year. Although members of the Commission were unanimously in favour of the scheme, yet there seems no likelihood that Legislative action will follow for the next few years to come. General depression and unemployment have thrown such burdens on the Government that, even though some measure of socialized health service is more needed than ever before, no Government in Canada will likely bring forward any Health Insurance Legislation at this time, particularly if it involves any considerable contributory assistance by the state. First, the already overloaded taxpayer would oppose most strenuously any measure that would add to his burden. Secondly, why should the state assume further obligations, so long as the medical profession, by continuing to carry on its traditional generous policy of free treatment, relieves it of this responsibility?

I have no magical formula for these ills to offer you. The policy of *laissez faire* — let George do it—waiting to see what the Government will do, will get us nowhere. A vigorous exhibition of self-effort at this time, directed along sane and constructive lines, is much more likely to yield satisfactory results than anything else. The doctor is an individualist by training and practice, but if we, as medical men, desire to find a solution of the economic ills of society and contribute something to their solution, we must organize for that purpose; we must become socially minded; we must act as a group. There must be an awakening consciousness on the part of the profession to the needs of a study of the various factors that underlie the complaint that "sickness is costing too much." At no time has the old adage "The Lord helps those who help themselves," been more applicable than now. Unified ideals, purposes, and action by the profession of Canada, is essential to a satisfactory solution. The example of the French profession should inspire and encourage us. There is need of experimental action on the part of organized medicine—at first by small groups, such as, local medical societies, *e.g.*, the Essex County plan in England, the Pierce County plan in Washington, etc. Experience is the best teacher and by experiment we gain experience. If such a plan proves to be satisfactory in dealing with a small group in a community, then it may, with some degree of confidence, be extended to the whole community.

## CONCLUSIONS

1. There is an outstanding problem facing the medical profession to-day which must be solved by the profession, or someone else will solve it for them.

2. Able medical leadership, backed by an active study group in Economics, is a prime

need in every community if a solution satisfactory to all concerned is to be reached.

3. The "insurance principle," as applied to Health Service, is both logical and sound. It enables the uneven cost of individual sickness to be spread over the group; the experience of numerous industrial medical aid organizations affords ample proof of this.

4. The medical profession should devise means for the adequate medical care of the part-pay patient, should encourage his habits of thrift and sturdy independence of character, and preserve him from becoming a pauper.

5. Voluntary medical aid organizations in industry and in the low salaried class should be encouraged and developed on sound economic principles.

6. Compulsory health insurance is coming—let us be well prepared to meet it when it arrives.

7. In my opinion, the mingling of cash benefits with a health service will spell ruin for the latter and will confuse the issue with unemployment insurance.

8. In every centre of population there should be a well organized and trained social service department—a commercial credit bureau if you like—to separate the indigent, the cost of whose care should devolve upon the State, from the non-indigent. Local medical societies should initiate and actively prosecute research work of this character. The results will repay the effort.

9. There is a great need of systematic education of the public as to the absolute necessity of budgeting for sickness, just as they do now for other necessities and for luxuries.

10. In view of the practical certainty that Health Insurance Legislation will not be considered by any government in Canada in the near future, the establishment of complete diagnostic facilities in all the principal centres, available to all the population as a State contribution, would, in my opinion, be the best single measure towards lowering the cost of medical service that could be put into operation at this time.

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## SIMPLE GOITRE*

BY A. CLIFFORD ABBOTT, B.A., M.D., C.M., F.R.C.S. (EDIN.),

*Winnipeg*

### PART I.

MUCH has been written and much remains to be learned about the functions and diseases of the thyroid gland. At the present time great confusion prevails, not only among lay people but among the medical profession in regard to simple goitre. One would think that after fifty years of intensive study in every country in the world some definite standard as to what constitutes a simple goitre would have been formulated. This has not been done. Nor can the blame be laid at the door of any one group of medical men in any part of the world. The present day literature is most confusing and it is only recently that any definite steps have been taken to standardize nomenclature. The variable terminology applied to the same histological picture has been and still is one of the stumbling blocks in thyroid pathology.

McCarrison[1] concisely states the reasons for so much confusion as follows:— (a) the want of general agreement as to what constitutes a "goitre"; (b) the fact that various types of disease included under this generic term are not always clearly differentiated; (c) the lack of complete etiological and epidemiological surveys based on pathological differentiation of the various types of disease; (d) the failure to recognize that just as there are several types of simple goitre so there are several causes of goitre, each one as important as the other; and (e) the incompleteness of our knowledge regarding the functions of the thyroid gland, the factors which disturb the normal exercise of these functions, and the relation of the disturbing factors to each other.

In a paper presented before the Winnipeg Medical Society in May, 1925, based upon the examination by Doctors Hamilton and McRae[2] of 2,300 children selected from various schools

* This and succeeding papers are based upon the study and correlation of the records of 30,713 Winnipeg school children.

in Winnipeg and surrounding districts, much emphasis was laid upon the high incidence of thyroid enlargement. In many of the schools as high as 60 to 80 per cent of the children were found to be affected. This seems an extremely high proportion.

With their survey as a starting point, the author undertook to review the literature on the etiology, histology, and physiology of the thyroid gland, and, if possible, to correlate present ideas with the findings of a study made upon the records of 30,713 Winnipeg school children. In addition, the relationship between septic teeth, tonsils and nutritional disturbances was studied, with the purpose of determining whether or not iodine or lack of iodine was the underlying cause of thyroid enlargement, or whether thyroid enlargement in children is not a much more complex affair, based on associated infection, nutritional disturbance, race, habits, customs, place of residence, age, sex, puberty, menstruation, unhygienic conditions of life, composition of foods, water supply, etc.

## ANATOMY

The anatomy of the thyroid gland is well known. It consists of two lobes connected by an isthmus which lies upon the trachea at the level of the second to the fifth tracheal ring. Each lobe covers antero-laterally the lower half of the thyroid cartilage, cricoid cartilage, and the upper three to six tracheal rings. Each lobe is convex laterally and concave medially. The upper pole is conical and the lower is rounded. The right lobe is usually slightly larger, higher, and on a more anterior plane. This anatomical difference explains (1) why most people with goitre notice it first on the right side; (2) why adenomata in the right lobe bulge forward above the clavicle; (3) why adenomata in the left lobe tend to grow into the thorax (substernal or intrathoracic goitre).

The thyroid gland of the fetus and new-born is somewhat different; it is "V" shaped. The lateral lobes are rather a continuation and widening of the isthmus, and the lower poles do not extend below the level of the lower margin of the isthmus.[3]

## PHYSIOLOGY

A normally functioning thyroid gland is an essential factor for the normal development of children. It is an essential in the control of those physical and chemical activities which constitute general metabolism. To perform this function, the thyroid requires a certain amount of iodine, varying with the individual requirements, which cannot be calculated but can only be estimated roughly. No two individuals are necessarily alike.

The function of the thyroid is both anabolic and katabolic. By means of its products, of which there are probably more than one, it stimulates and controls the growth of all tissues and sustains the activity of all tissue cells. It also regulates the normal processes of metabolism, in particular the nitrogenous and respiratory changes, and ensures the combustion of certain toxic products of normal metabolism which accumulate in the body in its absence, and, it reinforces the defensive mechanism of the organism against bacterial toxins.

De Quervain[4] concisely states the functions of the thyroid under four headings: (1) control and stimulation of tissue growth in general; (2) control and stimulation of the functional processes of the tissues; (3) neutralization of toxic substances produced in the normal metabolism of the tissues; (4) assistance in the defensive action of the organism against bacterial toxins.

In the exercise of these functions the structural appearance of the thyroid varies according to the phase of its activity. In the resting phase of its physiological cycle colloid is stored; in the active phase colloid is reabsorbed and excreted.

Under normal conditions there is no great change in the gland, but under times of stress and greater need large areas are engaged in active production, and the whole or greater part of the thyroxine-containing colloid may be mobilized, giving one the picture of a hyperplastic gland. Undoubtedly the thyroid responds to influences such as heat and cold, place of residence, oxygen supply, age, sex, puberty, sexual activity, worry, unhygienic conditions of life, food composition, menstruation, pregnancy, lactation, menopause, infec-

tions, exertion, fright, activity, etc. It is a very sensitive organ, increasing or decreasing its activity with great rapidity as circumstances require.

The normal thyroid has a tremendous physiological reserve. We[5] have shown experimentally that at least one-half of a dog's thyroid can be removed surgically without any disturbance in the well-being of the animal, and with no visible change in the histology of the remaining gland tissue until the end of four weeks. At that time hyperplasia, compensatory in character, begins, and the gland increases in size and becomes more vascular; colloid disappears, the epithelial cells lining the acini become tall columnar, and marked tufting occurs. (Figs. 1 and 2).

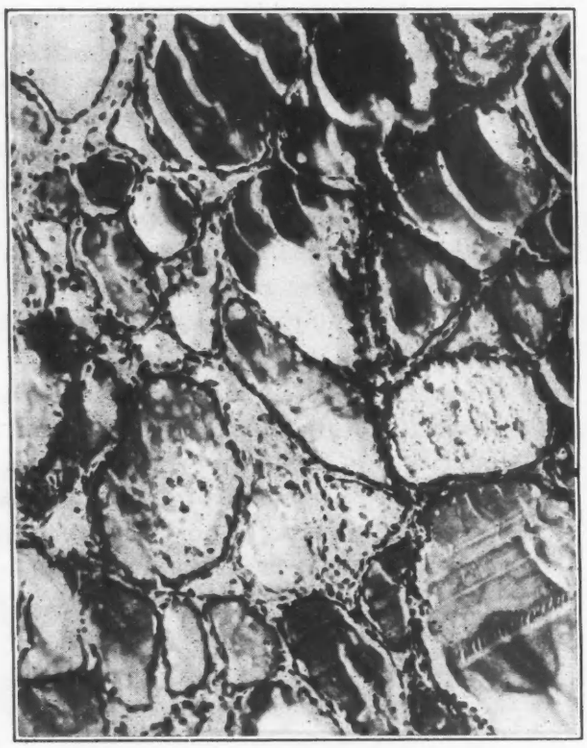

FIG. 1.—The thyroid gland of a dog before interference. Note the large amount of colloid and the flattened cells lining the acini.

FIG. 2.—The same thyroid as in Fig. 1, four weeks after removal of one-half of the gland. Note the loss of colloid, the tall columnar cells and tufting. This hyperplasia does not always occur.

We have also shown that this same change can be produced much earlier by removing three-quarters to five-sixths of the gland, hyperplasia becoming evident in about two weeks in animals leading a sedentary life in a cage.

McCarrison[1] states "that the proper exercise of the gland's functions depends on its innate efficiency and stability, on its normal nervous control, on its adequate nutrition, and on the adequate supply to it of those materials with which it elaborates its products and on which it relies for the normal revolution of its cycle of activity."

Iodine is one of the most important of specific substances necessary for the well being of the thyroid gland. It is not only an antiseptic, a catalytic agent, a constituent of at least one of the gland's active principles, but also has a chief share in the normal development of the thyroid gland by initiating and maintaining the normal revolution of its cycle of activity. It is thought that 1 mgrm. of iodine daily is more than sufficient for the normal maintenance of iodine equilibrium.

## ETIOLOGY

Many theories have been offered as to the causation of goitre. Briefly these may be grouped under four general headings.

1. *The earth and water theory.* — This is one of the oldest theories and it has many well known supporters, including Bircher and Kocher. These writers ascribe the cause of goitre to inorganic or organic chemical substances contained in water. Wagner, as early as 1680, drew attention to the fact that people using water from certain wells developed goitre; also that this could be prevented by boiling the

water. Some writers believe it is due to the presence of lime, magnesium, iron and copper pyrites in the water, while others believe it due to lack of iodine. The latter is of special interest in Winnipeg. Naturally this could not have been true of the goitre wells, as boiling prevented goitre.

McCarrison[1] has shown that in Himalayan India there is no evidence that the incidence of the disease is in inverse ratio to the iodine-content of the soil. In the heart of the endemic area, two adjacent places may have the same amount of iodine in their soils, yet goitre may be endemic in the one and not in the other; or the soils of two adjacent villages may be equally poor in iodine yet goitre may be four times as prevalent in one as in the other, although the water supply and habits of the people are the same. Moreover, the water in one place may contain appreciable amounts of iodine (300 parts per 100 billion parts of water) and yet goitre may be endemic therein; the water supply of another and adjacent place may contain no determinable amount of iodine and yet goitre may not be endemic therein; the water supply of two places miles apart may be the same and yet goitre be present in one and not in the other.

2. *The infective theory.*—This is a particularly interesting theory and one which will be discussed more fully in connection with the incidence of thyroid enlargement in children with infected tonsils and teeth. McCarrison[1] is the best known advocate of this theory and he has shown beyond a doubt that in India infection plays a very important rôle. Galli-Valerio, Gaylord and Messerli also are staunch supporters. Much can be said in favour of it. McCarrison[1] has shown that laboratory animals in iodine-poor localities develop goitre quickly unless kept under the most scrupulous hygienic conditions, Perfect cleanliness, however, will prevent it even in the presence of a *marked lack* of iodine. Note the statement that I do not use the expression *absence* of iodine. It is difficult to supply food with a complete absence of iodine.

On the other hand, in the presence of a great deal of infection, iodine in large amounts will not protect the animals against thyroid enlargement. McCarrison[1] has shown that water containing 300 parts of iodine per 100 billion parts of water has not prevented the occurrence of the disease in endemic form where much bacteriological impurity is present in the water. Moreover, 1,200 parts of iodine in 100 billion parts of water did not prevent thyroid enlargement in young men (experimental) who consumed daily large amounts of the unboiled suspended matter removed by filtration or sedimentation from a grossly polluted, goitre-producing water.

The substitution of a bacteriologically pure for a bacteriologically impure water has caused goitre to disappear from an area in which the affection has been endemic for 70 years. All these facts have the stamp of truth which cannot be overlooked. It behooves us therefore to scrutinize carefully our cases for evidence of this factor in our own district. Let us at the same time remember what McCarrison says, despite his great belief in the infective theory, namely, "The constellation of causes which gives rise to goitre is not always the same, nor is the character of the disease identical in different parts of the world."

3. *Absence of iodine from the food.*—This theory was formulated by Prevost in 1849 and Chatin in 1851. The works of Hunziker and Bayard have conferred upon it a belated credibility. Let us recall three facts in regard to iodine. (a) There is no such thing as absence of iodine. One can have a deficiency but not a complete absence. (b) Under normal conditions, the thyroid gland contains more iodine per unit weight than any other organ in the body. (c) The chief derivative of the thyroid gland, thyroxine, is an iodine compound. We therefore start with the natural assumption that a definite quantum of iodine is essential to normal thyroid metabolism, a lack necessarily producing derangement in function.

Marine and Kimball's[6] work amongst the school children in Akron, Ohio, conclusively showed that iodine medication prevented the high incidence of thyroid enlargement in that district. Moreover, administration of iodine to children with enlarged thyroids caused a subsidence of the gland to normal in the vast majority of cases.

Lunde,[7] of Oslo, Norway, estimated the amount of iodine excreted in the urine. He found that the amount of iodine excreted by adult males in Norwegian school districts was approximately in inverse ratio to the incidence of goitre among adolescents. A further discus-

sion on iodine will be presented when the incidence of thyroid enlargement in Winnipeg school children is considered.

*The multiple causation theory.*—It is now accepted that the factors which give rise to goitre are not always the same, nor is the character of the disease identical in different parts of the world. The theory of multiple causation seems most reasonable, and I hope to be able to show conclusive evidence of its validity at a later stage of this work.

Undoubtedly, in our own community, iodine deficiency cannot be the sole cause, owing to the varied distribution of goitre. One must consider many other factors such as diet, overwork, lack of sufficient rest, infection, age, sex, nationality, etc. Nationality is of the utmost importance in our own series, and one has to go into the different habits of different people with special care in regard to their food to avoid coming to a wrong conclusion. As the multiple causation theory is so far reaching and embraces such a wide field it will be dealt with as we pass over the various statistical records of our series of 30,713 school children.

## THE CLASSIFICATION OF SIMPLE GOITRE

One usually hears the simple enlargement of adolescents spoken of as "colloid goitre." There is however some variance of opinion on the matter. Breitner[8] operated upon one hundred young adolescents and found all to have hyperplastic glands. On the other hand, we find in this region that the thyroid removed post-mortem from children during adolescence, whether enlarged or not, is of the colloid type.

It is now believed that we have at least three varieties of simple goitre. The first is the classical type found in mountainous regions and variously named parenchymatous goitre, adeno-parenchymatous goitre, simple hyperplastic goitre or chronic hypertrophic goitre. This is the type that Breitner[8] found in his series of adolescent goitres. The second is the diffuse colloid goitre found chiefly in non-mountainous countries and near the sea-coast. The third type was named lymphadenoid goitre by Williamson and Pearce.[9] These are unrelated in their origin to endemic influences.

It might be well to consider these three types in more detail so as to be in a position to foretell what type of thyroid one is to expect in a certain district.

1. *Parenchymatous or chronic hyperplastic goitre.*—This is the classical type of thyroid found in mountainous countries. It is also found in animals kept under unhygienic conditions.

McCarrison[1] states that: "Parenchymatous goitre is essentially a place disease; it prevails with different degrees of intensity in different regions and in different parts of the same region. The intensity of the epidemic is subject to fluctuations." It is especially prevalent in agricultural districts, although in many towns in endemic zones it may be rife. It is commoner in the poorer than in the richer classes. It exhibits distinct seasonal variations, being more prone to make its appearance in the spring and early summer months. There is a marked family predisposition or hereditary tendency to the disease, the children of goitrous mothers being very prone to become goitrous; consanguinity favours its development. It is associated with congenital goitres, cretinism, deaf-mutism and idiocy; these sequelæ being as much a part of the endemic as the goitre itself. In regions of low endemicity it is much commoner in females than in males; while in regions of high endemicity its incidence in the two sexes is more equal.

Many theories have been advanced here but two remain. The iodine deficiency theory has had and still has many ardent supporters. On the other side is the infectious or toxic theory. It seems probable that both these factors are contributing causes. McCarrison,[1] after a careful investigation of numerous water supplies associated with endemic goitre, believes that while a low iodine content of the soil and drinking water is, in Himalayan India, frequently associated with this type of endemic goitre, the association is not invariable nor is iodine deficiency in the soil and water an ultimate cause of the disease. On the other hand, he believes that the association of goitre with a low iodine content of the food is not invariable, nor is iodine deficiency the ultimate cause of hyperplastic goitres. He has shown that animals exposed to infection develop this type of thyroid enlargement, while others, under similar conditions, minus the infection, do not develop thyroid enlargement. Moreover, animals housed under very unhygienic conditions are not protected completely by an excess of iodine. V. Fellenberg, in Switzerland,

McClendon, in the United States, and Huens, in New Zealand, believe that a relatively low intake of iodine is commonly associated with a high incidence of goitre.

Food also is held to play a part. Excessive fat or lime is believed to produce hyperplastic goitres. An increased provision of iodine, proportionate to the excessive ingestion of fat or lime, will prevent the development of thyroid hyperplasia or the undue accumulation of colloid in the gland and the development of either type of goitre. It is therefore established that a sufficiency of iodine and a balanced adjustment between iodine and certain other constituents of the food are essential to the initiation and maintenance of the normal revolution of the thyroid gland's cycle of activity, *viz.*, to normal secretion, storage of colloid, and to normal resorption or excretion of colloid. Moreover, the amount of iodine required by the gland for the purpose depends on the composition and quality of the food and on the hygienic conditions of life. Cameron,[10] in a recent publication, comes to the same conclusion, stating that "We can therefore reasonably conclude that there is a close relationship between deficiency of iodine in the diet and the occurrence of simple endemic goitre. Our present knowledge of thyroid function, therefore, permits us to conclude that at any rate in a great degree the occurrence of a simple goitre follows upon an iodine deficiency."

The pathological picture is one of secretory activity with hyperplasia predominating. Many new small vesicles are formed and colloid is conspicuous in its absence. Overstrain leads to fibrosis. Solid masses of cells appear (adenomata) and in some areas colloid containing vesicles (colloid adenomata).

In childhood in mountain districts one finds the parenchymatous type predominating, while in adults the gland has passed on to the adeno-parenchymatous type. Here we see a gland straining to satisfy the needs of the body tissues for its own active principles. In many cases it fails to do so. The need is so acute that hypothyroidism results. Breitner[8] states that all pregnant women are hypothyroid. As a result one would expect to find that the fetal tissues lack the necessary active principles, and that the fetal thyroid is unduly stimulated, so that congenital goitre or even cretinism result.

In a histological examination of 100 fetal thyroids Abbott and Ball[3] found that a large percentage actually had pathological changes. The Table below illustrates the changes found.

| | |
|---|---|
| Colloid distension ..... | 5 |
| Columnar epithelium .... | 16 |
| Follicular plication .... | 33 |
| Interfollicular epithelium | 31 |
| Lymph follicle ..... | 5 |

The histological notations of the above were so exaggerated that they should be interpreted as pathological. A fetal thyroid, three times the normal size, occurred in a Cæsarean baby. The mother had no visible thyroid gland, and unfortunately we were unable to get the mother's basal metabolism. However, goitre is very prevalent in the district from which the patient came.

2. *The diffuse colloid goitre.*—The geographical distribution of this type of goitre has not been as clearly defined as that of the hyperplastic type. It is the type that we probably have to deal with in our vicinity. In the examination of 100 new-born babes we found[3] that 41 per cent showed anatomical disease. The pathological histology was based upon alterations found in the adult human thyroid because of the close similarity in their anatomy. In 5 per cent the acini were so filled with colloid as to be classified as pathological.

The difficulty of obtaining specimens of colloid goitre in children can be readily understood. In this type, however, we find vesicles of many shapes and sizes, distended and distorted by the accumulation of colloid. There may or may not be any evidence of antecedent hyperplasia and hypertrophy. It would appear that not all colloid goitres have a previous hyperplastic stage. Williamson and Pearce believe that there is a type of this disease in which colloid storage occurs without antecedent hyperplasia, to the complete exclusion of active secretion. McCarrison[1] states that the development of colloid goitre depends on other things besides iodine, and that it is probably related, in some part at least, to change in the concentration of certain ions within the cells, plasma, and colloid of the gland.

It is essentially a disease of the plains, low altitudes, and sea coasts. Certainly in our area the disease (so-called) is endemic, as it occurs about equally in males and females. Its distribution is peculiar in that it is more prevalent

in some races than others, commoner in the poor than the rich, commoner at about the age of puberty than before or after. This fact makes it difficult to pin the cause on water, as all use the same supply. In many cases the goitre appears as early as 6 or 7 years of age, gradually increases in size until the age of puberty, and then gradually disappears spontaneously. De Quervain states in a paper published in 1922: "the histological structure of goitres varies according to the part of the country." We believe that in our own locality the common type of goitre among the general population is the diffuse colloid goitre, with or without hyperthyroidism, and there is a fair percentage of exophthalmic goitre.

3. *The lymphadenoid type of goitre.*—The appearance of this type of goitre in man was first described by Williamson and Pearce.[11] They define it as the hypertrophic reaction of a physiologically insufficient organ with which there occurs a preponderance of lymphocytic aggregates, fibrosis, and a peculiar atrophy of the parenchyma. McCarrison[1] produced thyroid hypertrophy resembling this in rats. He describes the macroscopic appearance as a small bright or darkish red gland. Microscopically, in the progressive stage it is characterized by a secretory activity closely resembling Graves disease. In the regressive stage fibrosis and exhaustion of the epitheliel cells predominate. Collections of round cells are prominent, and from this one gets the name of *lymphadenoid goitre.*

This type of thyroid enlargement is intimately associated with a deficiency in vitamines A, B, and C. Deficiency in these vitamines apparently produces a physiologically subnormal state of the thyroid associated with a metabolic upset and the production of toxic metabolites. It also upsets the function of the gastro-intestinal tract, resulting in stasis and absorption. McCarrison believes, therefore, that these changes resulting from faulty food are evidence of attempts at compensatory hyperplasia in an organ rendered physiologically inefficient by imperfect nutrition or the action upon it of metabolic or intestinal toxins or, more probably still, of both together.

We might expect to find this type of thyroid in its progressive stage in young children. Moreover, its regressive stage will be found in adults who have had this deficiency from childhood. These subjects, carrying locked up in their thyroid glands the lymphoid centres so much stressed by Warthin,[12] will be prone to develop Graves' disease at a later period in life.

In closing we might draw attention to a statement by James Berry in 1901: "But although goitre in most cases is to be regarded as an endemic disease, caused by a definite poison, whatever the poison may be, it is impossible to assert that all cases of goitre originate from the same cause." After thirty years of intensive study by the profession in all parts of the world, the statement still holds. Our only hope is that further study and research will enable us to eliminate the scourge, not with the knife but by preventive medicine.

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ABDOMINAL PAIN DUE TO HYPOTHYROIDISM.—J. William Hinton calls attention to hypothyroidism as a factor in producing abdominal pain, and emphasizes that patients giving negative roentgen evidence of changes in the gastro-intestinal tract, the gallbladder and the genito-urinary region, as well as negative results in the other laboratory procedures, may in a small percentage of cases be suffering from hypothyroidism; in this group with negative roentgen observations a metabolic determination should be done before any treatment is instituted or before the patients are submitted to an exploratory laparotomy, as occasionally a diagnosis will be established and the symptoms relieved with thyroxine and thyroid extract, the patient being saved a needless operation. There seems little question that, in the past, probably quite a few exploratory procedures have been undertaken with negative results or at least with symptoms persisting after the operation, in which case the entire trouble was referable to the thyroid gland. The condition is probably due to a hypoperistalsis with a pylorospasm and retention of undigested food in the stomach; after the patient vomits the retained food, or the stomach slowly empties, the symptoms are relieved. The author does not want to leave the impression that all patients with abdominal pain in which the roentgenological observations are negative are suffering from hypothyroidism, for such is not the case; but if this condition is borne in mind a definite diagnosis can be made in a small percentage of cases, and the individual can be benefited by the proper medication. On the other hand, a patient may have a minus metabolic rate and a definite intra-abdominal lesion which will need either medical or surgical treatment. Of course, no benefit could be expected from the abdominal pain by treating the hypothyroidism and neglecting the other condition that is actually causing the pain.—*J. Am. M. Ass.*, 1932, **98**: 1702.

# COARCTATION OF THE AORTA WITH REPORT OF THREE CASES

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ON November 28, 1931, a young man died suddenly while skating. Autopsy revealed the fact that death was due to rupture of the aorta, which was dilated and thinned proximal to a complete obliteration of the lumen of the descending arch, just distal to the insertion of the ligamentum arteriosum. This is the first instance of coarctation of the aorta observed in Vancouver. By one of the strange vagaries of fate two further cases were observed here in the subsequent six weeks. The rarity of the condition and the unusual circumstance of three such cases appearing in this short order would seem to justify a brief report. No attempt will be made here to review the subject of coarctation, which has been so excellently and so recently discussed by our outstanding Canadian authority on the subject, Dr. Maude Abbott.[1] It may be wise, however, to preface these case reports with a brief description of the condition under discussion, since, because of its rarity, many practitioners are unaware of the existence of such a cardiovascular abnormality.

Coarctation is the term applied to a narrowing or a complete obliteration of the lumen of the aorta at or near the insertion of the ligamentum arteriosum—the vestigial ductus Botalli. This is distal to the origin of the subclavian artery and involves, therefore, the descending portion of the arch of the aorta. Two types of coarctation are described: (1) The "infantile" type, in which there is a diffuse narrowing of the aorta between the subclavian and the insertion of the ductus Botalli which is usually patent. This really represents a persistence or an exaggeration of normal intrauterine conditions and is not ordinarily compatible with adult life. (2) The "adult" type, in which there is a sharp constriction at just above or just below the attachment of the ligamentum arteriosum. In some cases the obliteration of the lumen is complete, while in others the remaining opening is described as extremely narrowed or the stenosis may be of moderate degree. There is usually in this type of coarctation ample evidence of extensive collateral circulation.

The cause of the condition is still a matter of conjecture. It is a congenital malformation arising as a result of factors operating during intra-uterine life. The theory originally advanced by Skoda has some merit. This suggests that the obliterating process that closes the ductus Botalli spreads to the adjacent aortic wall and causes the sharp constriction characteristic of the adult type of coarctation. Traction from the ligamentum arteriosum may also be a factor, by causing a sharp angulation at this point in the aorta. Again, the condition may result from an early embryonic maldevelopment of the vascular system, as the presence of certain associated anomalies would suggest. For further observations regarding the pathogenesis of this interesting condition the reader is referred to Abbott[1] and Blackford,[2] in each of whose articles an excellent bibliography is included.

The adult type of coarctation is not commonly associated with serious or major cardiac anomalies. Certain minor abnormalities occur with considerable frequency. Of these a bicuspid aortic valve is probably the commonest. Other defects are hypoplasia of the aorta, often with thinning and dilatation proximal to the coarctation, congenital aneurysms of the peripheral vessels, especially the cerebral arteries and subaortic stenosis. The infantile type of coarctation may, on the other hand, be accompanied by the gravest types of cardiac anomalies. Since the latter condition is practically incompatible with life it is of only academic interest.

Certain changes occur in the circulatory system as a result of coarctation. First of these is the dilatation of the aorta. As has already been mentioned, hypoplasia of this vessel is common and this condition may be apparent throughout the length of the aorta. The increased strain thrown on the first part of the aorta often leads to dilatation, and rupture may occur. Dilatation may also occur in the thoracic aorta just distal to the coarctation. Hypertrophy of the heart itself is frequently found. This may be a result of inter-

current infection or a complicating hypertension, or may result from the increased burden thrown on the heart by the coarctation.

The collateral circulation by which a blood supply is maintained to the trunk and lower limbs is a matter of considerable interest. When it is considered that the thoracic aorta may be completely closed, and that this condition may prevail in an apparently healthy adult capable of doing hard physical work, it is apparent that the collateral circulation must be considerable to maintain an adequate blood supply to the lower part of the body. The most important collateral circulation is that between branches of the subclavian, *i.e.*, the superior intercostal, the posterior scapular, the subscapular, and the internal mammary arteries, and the first few aortic intercostal arteries which arise from the aorta just below the constriction. The blood flows from the subclavian and its above-mentioned branches into these intercostal arteries and by them is conducted back into the aorta, from whence it proceeds to supply the body. There may also be anastomoses between the internal mammaries and the epigastric branches of the external iliacs. If, as may be, coarctation has its inception in early embryonic life it is easier to understand how an adequate collateral circulation can be developed without evidence of great strain on the cardio-vascular apparatus.

Most surprising is the fact that patients with complete obliteration of the thoracic aorta can live to adult years or even to old age. Of the 200 cases collected by Abbott[1] only 54, or 27 per cent, died before the end of the second decade and 52, or 26 per cent, lived after 40. Since one-half of the deaths occur between 20 and 40 coarctation must be regarded as a condition of young adults. The increasing number of cases reported recently suggests that this condition has been frequently overlooked in the past. Blackford[2] quotes autopsy statistics to show that it occurs once in 1,550 cases. Even this figure must be accepted with reservation. Most reported cases have been from autopsy findings and unless the autopsy is really complete the coarctation can be overlooked. It is possible to do a so-called "complete" post-mortem examination and fail to look at the whole of the aorta. No doubt many cases are missed in this way.

*Causes of death.*—The commonest causes of death in cases of coarctation of the aorta are spontaneous rupture of the heart or aorta, intercurrent infections, spontaneous cerebral hæmorrhage, and cardiac decompensation. Sudden death from rupture of the heart or aorta makes this condition important from the medico-legal aspect. As already mentioned, hypoplasia of the aorta is common. This hypoplastic aorta may become much dilated proximal to the constriction, and may rupture spontaneously or following excessive physical strain or a blow on the chest. The blood pressure is usually elevated and this further favours rupture of the heart and aorta. Intercurrent infections are a constant danger in these cases. Subacute bacterial endocarditis notably attacks any cardiac anomaly. The bicuspid aortic valve commonly seen in coarctation is subject to this infection.

Spontaneous cerebral hæmorrhages result from rupture of the congenital aneurysms so apt to develop in the cerebral arteries in these cases. Death may result from the gradual development of cardiac decompensation. This may be hastened by the presence of a complicating infection or hypertensive vascular-renal disease, but may also occur apparently as a result of the long continued strain thrown on the heart by the presence of the coarctation.

*Diagnosis.*—There are no characteristic symptoms. Occasionally the patient complains of indefinite leg pains, suggesting an insufficient circulation to the lower limbs. There may be muscular weakness, or even atrophy of the legs as compared with the arms. The physical signs are vascular rather than cardiac, and depend in part on the detection of the abnormal vascular channels resulting from the extensive collateral circulation. The heart is usually enlarged and there may be a systolic murmur at the base, often in the pulmonary area, though this is not constant. More common is a loud systolic murmur in the left interscapular region. Murmurs are also heard over other of the collateral channels. The radial pulse may be normal and is usually equal on the two sides, though occasionally the pulse at the right is greater than at the left wrist. The femoral pulse on the other hand is small. This diminution in the size of the pulse in the lower limbs results from the devious route the blood has to pursue as compared with the normal. When the radial and femoral pulses are

accurately timed it is found that the femoral pulse is retarded. Normally the femoral pulse occurs 0.01 to 0.02 seconds before the radial, but in coarctation this relationship is reversed and the radial may precede the femoral by as much as 0.02 seconds.[3, 4] The blood pressure findings may be of considerable importance in the diagnosis of coarctation during life. The blood pressure is usually elevated. This may be a result of a compensatory effort to maintain an adequate circulation to the lower part of the body. The pulse pressure is often increased. Normally the blood pressure in the femoral is higher than in the brachial artery, but in coarctation the femoral reading is lower. This difference in blood pressure between the upper and lower extremity is of great importance and is probably the most valuable single point in making the clinical diagnosis.

The dilated and tortuous collaterals may be seen or felt over the posterior or lateral thoracic or anterior abdominal walls. One commonly observed dilated vessel is the subscapular, running along the vertebral border of the scapula. It gives branches to the aortic intercostals which can in turn occasionally be seen or felt. An indirect evidence of this collateral circulation is occasionally obtained from radiographs of the chest which show irregular wavy erosions of the lower margins of the upper ribs due to pressure of the dilated and tortuous intercostals. This was recently emphasized again by Railsback and Dock[3] though it was originally pointed out as an autopsy finding by Meckel in 1827.

### CASE 1

D. McV. was first seen at his home on July 21, 1930, with Dr. L. W. MacNutt. At that time he was 18 years old and had been working as a gardener with the City Parks Board. He had been ill for two weeks with substernal soreness and a low grade fever, following a slight sore throat.

*His past history* revealed scarlet fever and mastoiditis at two, with good recovery following mastoidectomy; several mild attacks of "flu". Otherwise he had been well.

*His family history* was entirely negative.

*Physical examination* showed a well nourished and well developed young man. The tonsils were small, red, and definitely infected. The heart was enlarged to percussion, the apex being 3 fingersbreadths outside the nipple line. Pulse 96 and regular; temperature 99.2°; blood pressure 140/90. Otherwise the examination was negative. A diagnosis of rheumatic infection, with possible rheumatic endocarditis, was made.

He was seen again on August 12, 1930, when there was a definite aortic systolic murmur. The heart was as above. Diagnosis seemed to be clearly rheumatic aortic valvular endocarditis, and he was advised to take the necessary long period of bed rest.

He made a good recovery, and in 1931 was able to resume his work as gardener, which he followed without any subjective discomfort of any sort. On November 27, 1931, while skating one evening he suddenly collapsed. He was hurried to the Vancouver General Hospital but was dead on his arrival there.

Autopsy on November 28, 1931, by Dr. A. W. Hunter showed a well developed, well nourished young white male, slightly cyanosed, but with no visible marks of external violence. The peritoneal and pleural cavities were negative. The pericardial sac was distended with blood from a tear in the dilated and thinned ascending aorta. This rupture was 3 cm. in length and was 6 cm. above the aortic ring. The aorta was considerably dilated at this point, being 13 cm. in internal circumference and its walls were very much thinned. The aortic valves were bicuspid, due to congenital fusion of the coronary cusps. The raphe behind this cusp was almost obliterated, and there was no corpus Arantii on the normal cusp. The normal cusp measured 3 cm. along the free border, while the fused cusp measured only 2.8 cm. A definite rheumatic aortic valvular endocarditis was present, with warty vegetations along both cusps. There was a moderate degree of sub-aortic stenosis. The other heart valves were normal. The heart was considerably hypertrophied, weighing 550 grm. The left ventricle was 2 cm. in thickness and the right ventricle 1 cm.

The first part of the aorta was greatly dilated and thinned, as already noted. The great vessels were con-

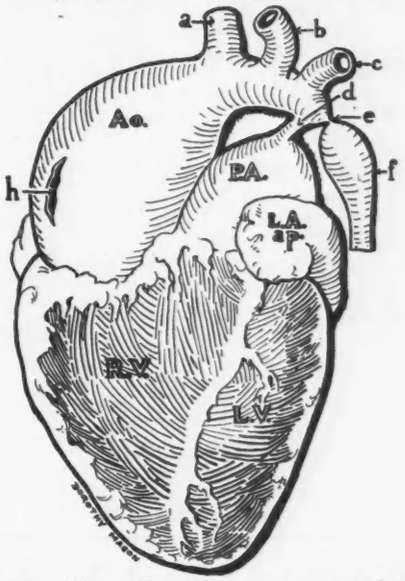


FIG. 1.—(*Case 1*). The first part of the aorta showed hypoplasia and was very much dilated and thinned. Collateral circulation was very evident. a—innominate artery. b—left common carotid artery. c—left subclavian artery. d—ligamentum arteriosum. e—site of coarctation. f—descending aorta. h—rupture in first part of aorta.

siderably dilated at their point of origin. The innominate artery was 2 cm., the left carotid 0.9 cm., and the left subclavian 1 cm. in diameter. The aorta narrowed rapidly at this point, and from an internal circumference of 13 cm. at the side of the rupture was here (at the origin of the left subclavian) only 2.5 cm. Just below this, and just beyond the attachment of the ligamentum arteriosum, was a sharp constriction in the aorta causing a complete obliteration of the lumen. The intima at this point was smooth and glistening. Below the constriction the aorta was slightly dilated as compared with its size throughout the rest of the thorax and in the abdomen. The aorta was definitely hypoplastic throughout. The internal circumference of the descending aorta at the level of the third aortic intercostal

artery was only 4 cm. The ligamentum arteriosum was a solid cord, 2 cm. in length, joining the pulmonary artery and aorta. There was a dimpling in the aortic intima at the point of attachment. The upper aortic intercostal arteries were dilated, tortuous, and their orifices in the aorta were larger than usual. There were two anomalous vessels of the same calibre on the intercostals, entering the aorta just below the coarctation. Unfortunately the collateral connections of these vessels were lost in the dissection. The internal mammary arteries were both dilated and could be traced to their anastomoses with the epigastric branches of the iliac arteries. Autopsy findings were otherwise negative. The brain was not examined.

Anatomical diagnosis was coarctation of the aorta, adult type; bicuspid aortic valves; subaortic stenosis; hypoplasia of the aorta; extensive collateral vascular anastomosis; rheumatic aortic valvular endocarditis.

### CASE 2

E. J., a Swedish carpenter, 38 years old, was admitted to hospital on December 26, 1931, in the service of Dr. F. N. Robertson and died on January 3, 1932.

On admission he presented the typical picture of advanced congestive heart failure.

*History of illness.*—For two years he had suffered from increasingly severe dyspnœa which had forced him to discontinue work 18 months before. During that time he had had several attacks of cardiac decompensation and had become progressively weaker.

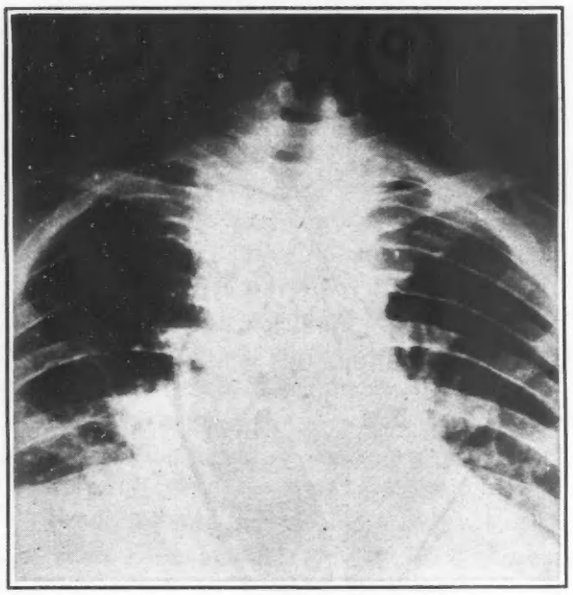

FIG. 2.—(*Case 2*). Radiogram of chest. Hypertrophy of heart. Density at right base (pulmonary infarct and hydrothorax). Note the irregular erosions along the lower margin of the upper ribs. This was strikingly apparent in the original film, but is not so clear in the reproduction.

*His past* and *family history* were negative.

*Physical examination* revealed an acutely ill white male, of the stated age. He was cyanosed, orthopnœic, and very œdematous. He had constant cough, was expectorating bloody sputum, and complained of a sharp pain in his right chest. His heart was greatly enlarged, his pulse was 110 and regular, and his blood pressure was 220/90. The lungs showed a dullness with diminished breath sounds at the right base and many moist râles throughout. A skiagram of the chest showed the cardiac hypertrophy and density in the right base (pulmonary infarct and hydrothorax). The liver was enlarged and tender. There was gross œdema of the sacrum and legs and feet. He failed to respond to usual measures and died on January 3, 1932.

An autopsy on January 4, 1932, by Dr. H. H. Pitts showed a well developed, well nourished, grossly œdematous, white male, of about the age stated. There was a healed appendectomy wound. The right pleural cavity contained 1½ pints of blood-tinged serous fluid and the left pleural cavity contained 5 to 6 oz. of serous fluid. Two recent egg-sized infarcts were present in the lateral aspect of the right lower lobe. The left lung was clear. The pericardial sac showed no increase in free fluid. The heart was markedly enlarged, weighing 1,240 grm. The valves appeared intact, except for slight fusion of the two coronary cusps of the aortic valve. These were shortened and measured 5 cm. across the free margin, while the other cusp measured 4 cm. across its margin. The raphe between the fused cusps appeared normal and there was a corpus Arantii on the normal cusp. There was slight puckering of the ventricular aspect of the fused cusps. The fusion appeared to be of inflammatory origin. There was very slight fenestration of the margins of one of the aortic cusps. There was no subaortic stenosis. The left ventricle was markedly hypertrophied, measuring 3 cm. in thickness, and the chamber was somewhat dilated. The ascending aorta and aortic arch showed considerable arteriosclerosis, but did not appear dilated. The coarctation occurred 2 cm. distally to the origin of the left subclavian artery. At this point there was a sharp constriction of the aorta and the lumen of the vessel barely admitted a probe 2 millimetres in diameter. The vessels arising from the arch were dilated, the internal circumference when laid open being, innominate 4 cm., the left common carotid 3 cm. and the subclavian 4 cm. At the point of coarctation of the aorta there was a small dimpled area on the internal surface immediately opposite the attachment of a solid fibrous cord, 2 cm. in length, which was attached to the pulmonary artery. This was the ligamentum arteriosum, the vestige of the ductus Botalli. The aorta just distal to the coarctation measured 5.5 cm. in internal circumference, and the orifices of the first two aortic intercostal arteries were quite enlarged, measuring 0.5 cm. in diameter, the vessels themselves being even larger. The abdominal aorta appeared smaller than normal, being only 3.5 cm. in internal circumference. Through the aorta proximal to the coarctation and in the vessels arising from the arch there was extensive

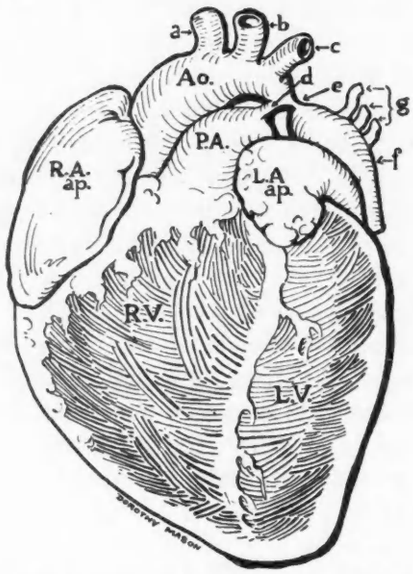


FIG. 3.—(*Case 2*). Practically complete closure of the thoracic aorta just at the insertion of the ligamentum arteriosum. Tremendous hypertrophy of the heart. a—f as in Fig. 1. g—dilated intercostal arteries.

intimal thickening but no atheromatous ulcerations. The peritoneal cavity showed a small amount of fluid. The liver was not particularly enlarged, but showed a marked degree of chronic passive congestion. The spleen was congested. The gastro-intestinal tract was negative save for old appendectomy. The kidneys were normal in appearance, smooth externally; the capsules stripped easily and on section presented a normal cut surface. The brain was not examined.

Diagnosis: Coarctation of the aorta, adult type; extensive vascular collateral anastomosis; cardiac hypertrophy; terminal pulmonary infarction and hydrothorax.

After the autopsy the radiogram of the chest was re-examined, and on the film irregular erosions of the lower margins of the upper ribs were plainly evident (see Fig. 2).

### CASE 3

A. L., a school girl, aged 12, was admitted to hospital on January 12, 1932, in the service of Dr. C. F Covernton. She died on January 14, 1932.

The patient had had an albuminuria since a severe attack of scarlet fever at 10. There had been increasing evidences of renal failure recently, with œdema of the face, trunk and extremities. She was born in Vancouver and was a normal infant. At 4 years of age the mother was told the child had congenital heart disease because of the presence of a loud systolic murmur in the pulmonary area. The patient had been well until the scarlet fever at 10.

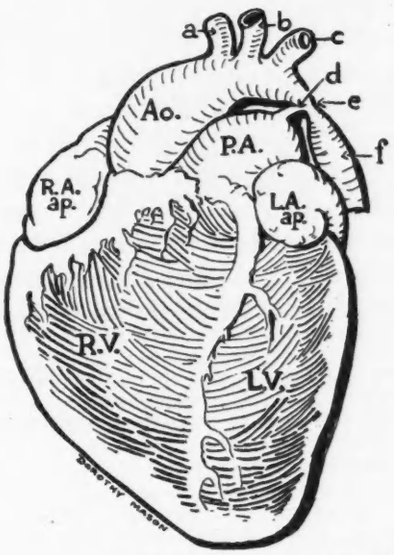


FIG. 4.—(*Case 3*). Narrowing of descending aorta, the adult type of coarctation, just at the insertion of ligamentum arteriosum. The lumen of the aorta at this point was approximately 8 millimetres in diameter. There was no dilatation of the great vessels arising from the arch, and no evidence of collateral circulation. a—f as in Fig. 1.

*Family history* was negative.

*Physical examination* in the hospital revealed an acutely ill, very œdematous and restless child. She was afebrile; her pulse was 130 and regular; blood pressure 160/80. Her heart was enlarged and there was a loud pulmonary systolic murmur which was also clearly heard in the left interscapular area. The lungs showed scattered râles. There were ascites and gross œdema of the face, trunk and extremities. The urine showed albumin (plus 3) and hyaline and granular casts. She died on her third day in hospital, with a diagnosis of chronic nephritis.

An autopsy on January 15th by Dr. H. H. Pitts showed a chronic nephritis with bilateral hydronephrosis. The kidneys were markedly contracted, together weighing only 54 grm. There was a terminal bronchopneumonia. The heart was slightly enlarged, weighing 264 grm., and the left ventricle was thickened. The valves were normal. The aorta showed a coarctation, consisting of a fusiform narrowing of the descending portion of the arch of the aorta. This constriction was maximal 2 cm. distal to the orifice of the subclavian artery. The diameter of the aorta at the narrowed point was 0.8 millimetres. At the site of coarctation was a slight dimpling on the intimal surface which proved to be the attachment of the ductus Botalli. A small probe could be passed into this vessel for a distance of 1 cm. from the aortic side. On the side of the pulmonary artery it was completely closed. The total length of the ductus was 1.5 cm. There did not appear to be any compensatory dilatation of the great vessels arising from the aortic arch. Neither were the aortic intercostals dilated. Other autopsy findings were negative, including the examination of the brain.

Diagnosis: coarctation of the aorta, adult type; chronic nephritis; terminal pneumonia. There was no evidence of collateral circulation.

## SUMMARY

1. Three cases of the adult type of coarctation are reported. In one of these the occlusion was complete; in the second the opening was extremely small; and in the third the stenosis was moderate.

2. Definite evidence of extensive collateral circulation was present in the first two cases.

3. The causes of death were: spontaneous rupture of the aorta (Case 1); cardiac decompensation (Case 2); intercurrent disease (chronic nephritis and terminal pneumonia) (Case 3).

4. While the diagnosis was not made during life in these cases it is felt that with the possibility of this condition in mind and with the valuable assistance to be secured from the recent literature such diagnosis should present no great difficulty.

I should like to express my appreciation for the interest and helpful suggestions of Dr. Maude Abbott.

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# CHORDOMA WITH A REPORT OF TWO CASES

BY O. L. STANTON, B.A., M.D.,

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WHILE still comparatively rare, cases of chordoma are being reported with greater frequency, probably owing to better recognition of the condition. As far as can be ascertained, none have as yet been reported in the Canadian literature. Two cases which have recently come to our attention, therefore, seem worthy of mention.

Luschka, in 1856, first described small benign jelly-like nodules at the clivus Blumenbachii, which Müller, in 1858, concluded were of notochordal origin. This was confirmed a few years later by the work of Ribbert, who also noted their occurrence in 2 per cent of autopsies. More recently, Stewart and Morin[7] examined 350 consecutive autopsies specially for these nodules and found them to occur in slightly less than 1.5 per cent. Stewart[6] designated these small benign tumours "Ecchondrosis physaliphora sphenoccipitalis," referring thus to their origin and to the bubble-like appearance seen on microscopic examination. When large enough to give rise to symptoms, they are termed "chordomas," as are growths of similar origin in the sacrococcygeal region and elsewhere along the course of the notochord.

Normally, the notochord disappears early in embryonal life, remaining only as a jelly-like substance, the nucleus pulposus, in the centre of the intervertebral discs. Several observers have shown that in the fetus small remnants of notochordal tissue may lie outside this usual location, and it is these aberrant cells which are believed to give rise to tumours. Thus, they may arise anywhere along the course of the primitive notochord. The commonest sites, however, are at its extremities, *i.e.*, the sphenoccipital and sacro-coccygeal regions. The spheno-occipital type gives rise to pressure symptoms characteristic of a tumour at the base of the brain — headache, vomiting, and optic neuritis. Various cranial nerves may become involved, as they are embedded in the growth. Tumours in this area need not be very large to give rise to symptoms. The largest one is reported by Jeliffe and Larkin,[4] measuring 11 by 7 by 6 cm. In the sacro-coccygeal region, if the growth projects posteriorly, there may be signs of an external tumour only. If it projects anteriorly, there is interference with defæcation and urination and signs of pressure on the sacral nerves. In this location the tumour may become very large. Stewart and Morin[7] report one measuring 80 cm. in circumference, and Bernard, Dunet and Peyron[1] one measuring 22 by 21 by 15 cm. Willis's[9] recent case, measuring 15 inches in length and weighing approximately 200 oz., is the largest yet reported.

Chordomas are usually slow growing and locally malignant, though a number of instances of metastases are recorded. Willis' case gave widespread metastases to the lungs, liver, spleen, kidneys, heart, thyroid and skin, probably due to invasion of the iliac vein by direct extension.

### CASE 1

K. J., a male, aged 62, labourer.

*Complaint.*—Pain and presence of swelling at the end of the spine.

*Family history.*—Negative.

*Past illnesses.*—Irrelevant.

*Present illness.*—In October, 1928, the patient fell on the edge of a wagon-box striking the base of his spine. He had pain for several days but no swelling was noticed. During the winter of 1928-29 he had no pain in the region of his injury. In March, 1929, he noticed soreness but no swelling. During the summer of 1929, he drove horses and had only occasional stiffness in the region of the sacrum. In the spring of 1930, he drove steadily in a car for two days, became sore, and noticed a swelling of the base of his spine. He had considerable pain after sitting for any length of time. The swelling was incised in April, 1930, but only blood was obtained. The wound healed but the swelling persisted and was incised again.

*Physical examination.*—July, 1930: Fairly well developed and nourished. Head, neck, thorax and abdomen showed negative findings. Usual weight 145 lb.; present weight 123 lb. Blood pressure 240/130, with slight arteriosclerosis of temporal and radial arteries. Hæmoglobin 70 per cent; white cells 6.500; erythrocytes 3,750,000.

*Special examination.*—Flattened over the end of the sacrum, a tumour was found, measuring approximately 4 inches in diameter and irregular in outline. It was firm in consistency and was attached to the skin, which was thickened and indurated.

At operation, the tumour was found to be irregular in outline, attached to the skin but not to the sacrum. It was not encapsulated. Through it were 6 or 7 areas of coagulated blood, each the size of a walnut. The

tumour was dissected out and a series of deep x-ray treatments was given. On October 11, 1930, another swelling in the same region was also dissected out and followed by deep x-ray therapy.

On January 23, 1931, another tumour was present on the upper portion of the left thigh posteriorly, which was of irregular outline, well encapsulated, firm and rubbery in consistency. It measured 7 x 7 x 4.5 cm. On section, it was seen to be divided into numerous compartments of various sizes by thick fibrous bands. Many

FIG. 1.—*Case 1.* Gross appearance of the tumour.

of these compartments contained a whitish mucoid material; others were brownish and evidently the seat of hæmorrhage, while others contained a mixture of the two.

Microscopically, bands of dense fibrous tissue were seen enclosing islands of tumour cells. This fibrous tissue showed some areas of lymphocytic infiltration. There were several areas of hæmorrhage. The tumour cells tended to grow in a cord-like or alveolar arrangement. They varied greatly in size. The smaller areas had one or two nuclei, were polyhedral or irregular in shape, with a solid pink-staining cytoplasm and a well-defined cell membrane. There were all gradations between these and large multinucleated cells with many large clear vacuoles and a mere rim of cytoplasm. A few whorled bodies resembling those described by Stewart and Morin[7] were noted. The nuclei also varied in size, were round or ovoid and usually contained a well marked nucleolus. No mitotic figures were seen but the nuclei were often lobulated, and frequently indented by vacuoles. Some nuclei were small and hyperchromatic. True nuclear vacuolation was not found. Running between the cells, very marked in some regions, was a bluish hazy homogeneous substance, mucin, apparently extruded from the tumour cells. In some areas, the cells

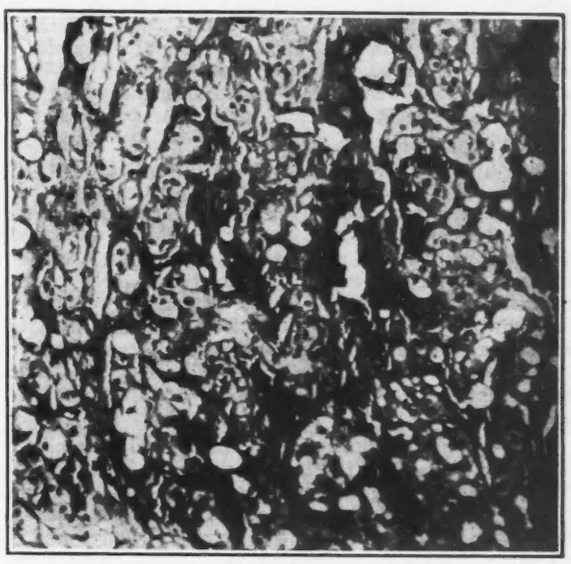

FIG. 2.—*Case 1.* Microscopic appearance of the tumour. Low magnification.

appeared to be small and compressed and separated by large amounts of mucin. Apart from the trabeculated bands of fibrous tissue, the stroma was scanty or absent. Blood vessels were found only in the above-mentioned trabeculated bands of fibrous tissue.

Sections of a small secondary growth in muscle presented the same picture. Considerable mucin was present.

### CASE 2

M. W., a male, aged 35, farmer.

*Family history.*—Irrelevant.

*Past illnesses.*—He had had a fall on the head four years ago. This left him dazed, but not unconscious.

FIG. 3.—*Case 1.* Secondary nodule in muscle.

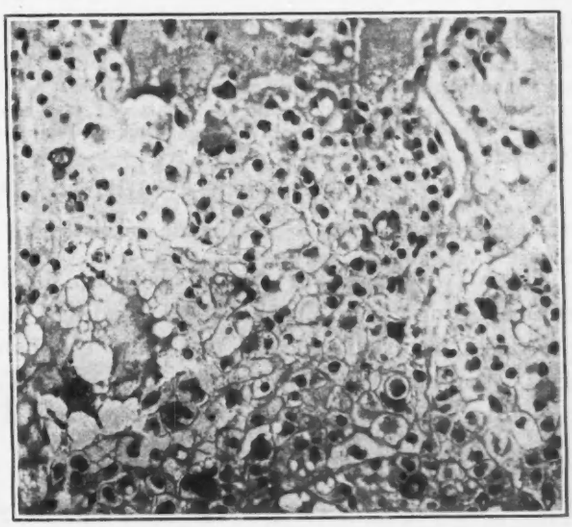

FIG. 4.—*Case 2.* Characteristic structure of the tumour.

He had no headache. Recovery was complete. His history was otherwise negative.

*Present illness.*—The patient was first seen on September, 1929. He complained of occasional vomiting attacks after meals. The general physical examination was negative. There was no loss of weight. He was mentally slow and memory for dates and places was poor. He complained later of pain in the upper jaw and a number of teeth were removed. In December, 1929, he showed paresis of the left side of the face and complained of headache in the right frontal region and pain in the upper jaw. The eye-grounds were negative at this time. In January, 1930, paresis of the left arm and leg was noted. Mental reactions were noticeably slowed. There was considerable incontinence of urine and fæces. The Wassermann reaction was negative.

At operation, a tumour was found within the cranium, having a deep attachment in the right temporo-frontal region. A portion of it, measuring 6 cm. in diameter, was removed. This was found to be irregular, nodular, encapsulated and in part cystic. It was greyish in colour with many purplish red areas. On section, it showed numerous engorged blood channels. After operation, the patient developed increasing weakness of the left side and paralysis of the left arm with epileptiform seizures. The pressure of the cerebro-spinal fluid was increased with a high cell count. He finally lapsed into coma and died about two months after operation.

At autopsy, a tumour was found firmly attached to the inner surface of the basilar process of the occipital bone. It measured 4.5 by 3.5 cm., and was soft, gelatinous and irregularly nodular. It extended into the sella turcica, compressing the pituitary body, and infiltrating the right temporal lobe. It was not attached to the dura. The optic nerves were stretched over the tumour and displaced to the left.

Microscopically, sections showed all gradations between comparatively small cells with solid pale pinkish cytoplasm and large typical physaliphorous cells, 100$\mu$ or more in diameter, with many vacuoles and a mere rim of cytoplasm. Many cells contained two or more nuclei. The nuclei were mostly large and pale, with a well marked nucleolus. Many showed indentation by the vacuolated cytoplasm. Several nuclei showing true nuclear vacuolation were noted. In some areas where an alveolar arrangement. Separating the cells were large amounts of stringy, hazy, bluish-staining mucin. There was very little stroma, but some fibrous bands ran through the tumour and in these lay thin-walled blood vessels. Through this fibrous connective tissue were also a number of lymphocytes and collections of large endothelial cells, containing granules of brownish pigment. Among the tumour cells, several rounded bodies vacuolation was less marked, the cells tended to assume were noted measuring up to 100$\mu$ in diameter. These were made up of large bluish granules with a few small round pinkish hyaline-like bodies scattered amongst them. They were probably degenerating cellular material.

Sections of the spheno-occipital bone from various areas at the point of attachment of the tumour failed to show any invasion of the bone by the tumour growth.

These two cases are typical both in their clinical course and pathological findings of chordoma occurring at the two most common sites,—the sacro-coccygeal and spheno-occipital regions. While the microscopic findings usually vary considerably in different areas, the composite picture should never leave the diagnosis in doubt. Stewart described the outstanding histological findings as:— (1) the alveolar character of the growth; (2) the solid epithelial aspect of the younger, more cellular, areas; (3) the cytoplasmic and intercellular vacuolation; (4) the formation of intracellular mucin which later escapes to lie between the cells.

Cappell[2] and Willis[9] described a hyaline capsule surrounding secondary growths. No evidence of such a structure could be made out in the small secondary nodule in the muscle in Case 1.

The cause of the vacuolization which is such a striking feature of these tumours has not been satisfactorily explained. Several authors claim to have demonstrated the presence of intracellular glycogen, and suggest that this is responsible, but others have been unable to confirm these findings. In both our cases the specimens had been fixed in formalin, which precluded staining for glycogen.

While it has been shown that chordoma probably arises from aberrant notochordal tissue yet what causes these cells to proliferate is unknown. In a great number of instances, and in both our cases, there is a history of antecedent trauma. It would seem reasonable that in some cases trauma might be the exciting factor.

Treatment of the condition is unsatisfactory. Practically all spheno-occipital cases are inoperable. Radiation therapy is ineffective. In the sacro-coccygeal type, the usual course is to excise the growth as completely as possible and deal with the invariable recurrences in the same manner.

I am much indebted to Dr. H. J. Hassard, of Portage la Prairie, for the clinical history and the surgical material obtained from the first case.

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# TRANSURETHRAL RESECTION OF PROSTATIC OBSTRUCTIONS

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"The only way to the serene sanity which is the scientific mind . . . is to give every fresh idea its one intense moment of cool but imaginative attention before venturing to mark it for rejection or suspense, as, alas, nine times out of ten we must do."—Wilfrid Trotter (*Hunterian Oration,* 1932).

ANY transgression of the accepted tenets of medical practice, particularly when it is of such revolutionary nature as to disturb the tranquillity of the orthodox, will invariably meet with stern opposition and scepticism. They pursue a policy of relentless denunciation of the new idea until, imperceptibly, they are themselves engulfed in the stream of approbation when the innovation has proved its worth.

The modern approved methods of surgical relief of prostatic obstructions have been slowly evolved and perfected. Nothing deterred McGill from expounding his principles, even though they bade fair to reform the prevailing conceptions, and that despite the unswerving opposition of such masters as Guyon and Thompson, who still clung tenaciously to the theory of irreparable bladder atony. His insistence upon the adoption of bolder methods for the removal of prostatic obstructions gained favour only after fear had been mitigated by the beneficial results following its repeated performance.

The initiative in transurethral surgery was taken by Guthrie, who in 1830 stated that "the object is to divide the bars or the strictures with as little injury as possible to the neighbouring parts". This statement dogmatically expresses in brief the keynote of modern surgical practice relating to the treatment of prostatic obstructions. The eager desire for an optimum surgical result with a coincident minimum sacrifice of healthy tissue has prompted the institution of less radical procedures than those hitherto employed for their correction. The avidity with which these therapeutic measures have been adopted testify to their efficacy. In the light of present knowledge, Guthrie erred in stating "when the bar is complicated with median and lateral lobes, . . . . division of it cannot be effected in this manner". Unfortunately, this admonition has been adhered to and continues to be sanctioned by the majority of surgeons even at the present day. They have compromised only with respect to a relatively small proportion of prostatic overgrowths, namely, the bars and contractures of the vesical neck, which they are inclined to believe will be more suitably relieved by endovesical resection, but still grudgingly reserve the remainder, and by far the majority, for open operation. In our opinion this attitude has retarded progress, to the detriment of transurethral surgery, and has been responsible for the performance of untold numbers of needless and in many instances hazardous operations.

It is not our purpose to belittle the benefits occasioned by radical prostatic surgery, but merely to suggest that, in spite of the refinements in technique, the added safeguards of regional and spinal anæsthesia, the recognition of the importance of gradual decompression of the kidneys, and adequate pre-operative preparation of patients, it continues to be attended with a persistently high mortality rate and dangerously incapacitating complications and sequelæ. Thomson-Walker[1] in a recent study of the mortality rate following the single and the two stage suprapubic operations performed in 12 approved general hospitals in England found a total death rate of 19.5 per cent in 3,451 operations, with a rate of 20.5 per cent following the single stage, and 17.4 per cent following the two-stage procedure. We are inclined to believe that even this is a very

conservative estimate and that the mortality rate of the operation, particularly when performed by unskilled operators, more closely approximates 30 per cent. Obviously, there is an urgent need for its substitution by other measures, providing they prove equally corrective. This has been made possible by transurethral resection of the prostate which fulfills all the criteria demanded of an acceptable surgical procedure, *i.e.*, simplicity of operative technique, applicability, freedom from complications and disabling sequelæ, a negligible mortality rate, and above all uniformly satisfactory and lasting results. We shall endeavour to support these claims by argumentative proof and operative results.

Apropos, recent clinical and experimental investigations have demonstrated the fallacy of the theory that prostatic overgrowth is neoplastic in nature. Although a few investigators remain noncommital, the unbiased opinion of Ewing,[2] whose authority bears weight, is that true adenomata are rare in prostatic enlargements. The mere fact that rectal examination discloses the presence of a tumour-like mass in the pelvis is insufficient evidence for affixing an adenomatous label to the overgrowth, and particularly so when the histological study of the tissue reveals pathological changes highly suggestive of hyperplasia rather than neoplastic formation. The most acceptable explanation for the occurrence of hyperplasia in the prostate is that it is of inflammatory origin. Very few, indeed, have been privileged to study the early manifestations of disease and its response to appropriate therapy. We attribute the prevalent and erroneous impressions concerning the nature of prostatic enlargement to failure to recognize these early changes. We are convinced, after painstaking and continued observations of the transformation in the prostate following relief of congestion and drainage induced by partial resection, and the pathological study of the tissue removed at operation, that the majority of prostatic obstructions are the result of an insidious but slowly progressive chronic inflammation. The inevitable fate of an unresolved chronic inflammatory process is the deposit of fibrous tissue, and it is this which promotes retention within the acini of the gland and the subsequent proliferative changes resulting in the tumefaction recognized as enlargement or hypertrophy of the prostate. These phenomena are in no respect dissimilar to those observed when an inflammatory or infective process invades any other tissue of the body. Accordingly, chronic prostatitis, fibrous contracture, and hyperplasia of the prostate are fundamentally the same in basic pathology, with the exception that in each case the process has progressed to a different degree, dependent upon several factors, chief of which are the continuance of reactionary inflammatory changes at the vesical neck or its interruption by timely expectant or surgical measures. If it were otherwise how then would we explain the subsidence of symptoms and the relief afforded by local therapy without resorting to any type of surgery in persons who have obvious enlargement of the prostate, often with a moderate amount of residual urine; the infrequency with which enlargement occurs in those who have been adequately treated in the past for chronic prostatitis; the retrogression in the size of the organ after relief of tension and congestion afforded by drainage and partial resection of the prostate? They all proclaim inflammation. It would be preposterous to assume that the overgrowth is preponderantly neoplastic in nature, judging from its overwhelming incidence in males over the age of 50 (30 to 35 per cent, a proportion wholly incompatible with neoplastic incidence in any other tissue or organ of the body). Moreover, the histological picture of the tissue removed at resection, which is identical in every respect with that removed by enucleative methods, reproduces the structure of the normal prostate with the utmost fidelity. The true nature of the newly formed tissue is often obscured by reactionary inflammation, but it suggests hyperplasia rather than neoplastic change.

The importance of a definite therapeutic regimen for prostatic prophylaxis has been sadly overlooked by the profession at large. Chronic inflammations of the prostate, whether the aftermath of a specific urethral infection or the result of focal invasion, occur with astounding frequency, but may remain silent for a number of years. No routine physical examination is complete without rectal palpation of the prostate and the microscopic examination of its expressed contents. It is only by

the institution of sane therapeutic measures at this stage that we may hope to protect the affected individuals from the development of prostatic overgrowth and carcinoma in later life. The adoption of palliative measures is also to be commended for the care of congestive involvement of the prostate, commonly referred to as irritative prostatism. The individuals so affected complain of troublesome frequency and nocturia but have few if any of the objective signs of prostatic obstruction, other than possibly a negligible amount of residual urine. They will almost certainly run the gamut of congestion, partial and ultimately complete urinary retention, unless the progress of the disease is checked. They must be kept under constant observation and treated expectantly by such measures as periodic prostatic massage at 7 to 10 day intervals, supplemented, if necessary, by the passage of a full-sized urethral sound and the instillation of ½ to 1 per cent silver nitrate into the prostatic urethra in order to hasten the resolution of the congestion. A policy of watchful waiting should be pursued and the patients should never be hurried into what may prove a needless and often hazardous operation. If the residual urine measured on repeated occasions does not exceed two ounces and the symptoms have not been aggravated, perseverance with conservative treatment is definitely indicated, but if it continues to mount and the symptoms are unabated, due to the congestive irritability of the vesical neck, the obstruction may then be satisfactorily relieved by transurethral resection. The relief afforded may be likened to that following the removal of a foreign body from the eye in which case the spasm promptly subsides.

Transurethral resection of the prostate is by no means a panacea for all forms of prostatic obstruction, but clinical experience has shown it to be applicable to an ever-increasing number. Whereas in the beginning one of us (J.R.C.) employed the cautery prostatic punch for 14 per cent of the obstructions, principally bars and contractures of the neck, and later for 40 per cent, he now finds it applicable to 85 per cent of all prostatic obstructions, regardless of size, with uniformly satisfactory results. In addition to its applicability in the aforementioned conditions — irritative prostatism, bars and contractures—transurethral resection of the prostate by the cautery punch method has been found suitable for the relief of prostatic obstructions in individuals who by virtue of advanced constitutional defects, such as cardiovascular and renal disease, are rendered poor surgical risks, and for those who will not willingly submit to a major operation. This type of surgery is also admirably suited for the fibrous or atrophic obstructions which ordinarily resist enucleation either by the suprapubic or perineal route. In early carcinoma of the prostate resection by this means, in conjunction with the perineal implantation of radon seeds and the systematic application of deep x-ray therapy, has been followed by extremely beneficial results. Whenever urinary obstruction becomes pronounced as a result of carcinomatous infiltration of the prostatic urethra the patient may be comforted to an appreciable degree by partial resection. This method has also been applied with uniform success in correcting both immediate and late post-operative obstructions following incomplete suprapubic enucleation, and in hastening the closure of indolent suprapubic fistulæ, when for obvious reasons, such as the intervention of serious complications, the enucleation has not been undertaken for fear of jeopardizing the patient's life. In this latter group the fistulæ were observed to close promptly after cautery resection signifying relief of the obstruction at the vesical neck.

The principal objection of the general surgeons to transurethral surgery is based on the knowledge that if a prostatic lobule is allowed to remain after prostatectomy the result will be imperfect and the obstruction will not be satisfactorily relieved. A comparison between this status and that existing at the vesical neck after resection is not tenable, for in the first instance the remaining lobule remains freely moveable and may readily fall within the confines of the vesical sphincter, thereby occluding it, whereas in the latter the normal relations of the prostate remain undisturbed, and therefore obstruction will not persist, providing sufficient tissue has been removed.

Freudenberg (1897) visualized the tissue before its resection, but by far the greatest impetus to this branch of surgery was supplied by Young (1909) who devised the median bar excisor or "punch" for the relief of bar obstructions. In keeping apace with the advances in electrosurgery, one of us (J.R.C.) in 1919

presented the cautery prostatic punch, and shortly after a diathermy model, aiming thereby to reduce to a minimum the inherent dangers of hæmorrhage and toxic absorption from the denuded area at the bladder neck. He also devised a method whereby infiltrative anæsthesia of the bladder neck was accomplished under direct vision.

Irrespective of the type of operative procedure contemplated for the cure of prostatic obstruction, the pre-operative preparation is essentially the same, with the exception that in transurethral surgery no primary cystostomy is performed. In order that the patient may qualify for operation his clinical status must be carefully investigated, to exclude the possible coexistence of organic and nervous disease. Not infrequently the cardiovascular system has been vitally hampered by the "water dam" in the bladder and measures must be adopted to secure a maximum degree of recovery before operation is undertaken. The stability of renal function must be assured by repeated studies of the phthalein excretion during a given period of time and the estimation of the blood urea content. The kidneys must be decompressed by hydrostatic gravity or the gradual depletion of the bladder contents if complete suppression of urine and uræmia are to be averted. If the residual urine does not exceed four ounces, the patient may be catheterized intermittently during the preparatory stage, but this is not to be recommended as a routine procedure. Unless the obstruction is well advanced and a prolonged period of observation and drainage will be required before the patient becomes a satisfactory operative risk, he had best be hospitalized during the period of pre-operative preparation. The duration of catheter drainage will depend upon the nature of the obstruction, the severity of urinary sepsis, and the renal response to drainage. It must be continued until the clinical status of the patient becomes satisfactory. This may prove a difficult task, but a blood urea content of 30 mgrm. per 100 c.c. and a phthalein excretion of 30 per cent for the first hour are to be regarded as the minimum limits of safety. A persistent or recurrent fever demands careful investigation and the institution of appropriate therapy. Operation must be postponed until the temperature remains within the normal range for the twenty-four hours on three successive days. As a routine procedure we perform bilateral vasoligation according to Colston's technique a few days prior to the operation as a prophylactic measure to prevent the occurrence of epididymitis.

Providing there are no absolute contraindications, such as complete urinary retention, hæmorrhage, acute epididymitis, profound urosepsis or impending uræmia, cystoscopy is performed at the earliest date, to determine not only the nature of the obstruction and the configuration of the prostatic rim but also to exclude the presence of associated conditions such as diverticulum, vesical calculus, bladder tumour, etc. This procedure is repeated before the operation in order to familiarize the operator with the condition obtaining, and in the majority of instances the observer becomes impressed with the remarkable transition which has occurred due to the relief of congestion and tension at the neck, so much so that an obstruction which previously may have appeared too gross for resection now becomes entirely amenable to this type of surgery. These changes have been referred to by one of us (J.R.C.) as constituting the "fallacious orifice." The importance of urethral prostatic encroachment, except in the rare instances of intra-urethral valves and scars, has been greatly exaggerated with respect to its bearing on the obstruction. The urethral environs constitute the fixed portion of the gland, and therefore they do not materially interfere with sphincteric action. The all-important factor in the obstruction is the spasm induced by congestion and œdema of the tissues.

The reader is referred elsewhere[3] for a detailed account of the operative technique, since only the essentials will be discussed here. Twilight sleep is induced by hyoscine-morphine narcosis on the morning of the operation; one of us (J. L. W.) has successfully used nembutal with a morphine adjuvant in a few instances. Narcosis produced in this manner, supplemented by local urethral and infiltrative anæsthesia of bladder neck, has been found to be preferable to sacral, spinal or general anæsthesia, since complete relaxation at operation is undesirable.

Complying with the insistent demand for a cystoscopic component for the cautery punch, an improved instrument has now been perfected.[4] It enables, in addition to the endo-

scopic vision previously provided, cystoscopic visualization of the vesical orifice and the prostatic encroachment. This improved instrument consists essentially of the cautery punch sheath and the cautery blade, with the addition of the McCarthy foroblique lens system and a one-way irrigating channel provided with a water-tight locking device. The direct forward vision thereby provided permits the operator not only to visualize the tissue to be resected but also the determination of persistent obstruction. The tissue may be grasped and retained within the slot of the instrument or released if it has been found that insufficient tissue has been engaged for resection. The technique of the operation is simple and yet it requires a thorough familiarity with the endoscopic and cystoscopic appearances of the vesical neck and its contiguous structures. The punch sheath with the obturator *in situ* (preferably 30 F.) is introduced into the bladder, the obturator withdrawn and the lens system introduced to visualize the tissue at the vesical neck. The instrument is then gradually withdrawn so that the fenestrum or slot is made to impinge on the prostatic rim. If bladder tissue has inadvertently been grasped it is released. The lens telescope is then removed and the operative field dried by suitable means, after which it is infiltrated with 1 per cent novocaine introduced by an especially constructed syringe. After reassurance by reflected endoscopic light that the hold on the tissue has not been relinquished, the ' punch'' tube, bearing at its extremity a circular platino-iridium blade, to be subsequently charged with a low voltage electric current conveyed to it from a transformer, is introduced into the sheath of the instrument which has remained within the bladder, and advanced until it reaches the engaged prostatic lobule. The assistant is then instructed to apply the current at a predetermined voltage, usually about 4 volts, at which moment, but on no account sooner, the cautery blade is advanced with a gentle rotary movement thereby ''punching'' out a segment of tissue. The current is then ''broken'' and the instrument centred in the open bladder, the charge reapplied in order to coagulate the resected tissue within the instrument, facilitating its subsequent extraction when the cautery blade is withdrawn from its sheath. The actual burning requires no longer than 3 or 4 seconds. If a single segment is to be removed the operation has been completed, but if there is marked encroachment at the neck of the bladder the lens system may be reintroduced into the sheath, the instrument rotated on its long axis, and lobules of tissue visualized, engaged, and resected in all sectors of the orifice. In the past we have not removed more than two or three segments of tissue at any one sitting, but experience has proved that as many as 16 to 20 sections may be extracted with relative immunity from hæmorrhage, providing of course it is there to engage. The improved cautery punch enables visualization of the operative field after resection of several lobules of prostatic tissue as well as persistent tags, which may then be dealt with by the same technique, so that the orifice becomes free of obstruction. At the completion of the operation a large indwelling catheter—28 or 30 F.—provided with two enlarged lateral eyes, is inserted into the bladder and fixed in position. The bladder is washed free of clotted blood and the patency of the catheter determined before the patient is returned to the ward.

The immediate after-care is exceedingly important and consists primarily in maintaining free drainage of the bladder. If drainage remains unimpeded the discharge soon clears, but if clots are permitted to form in the bladder the subsequent spasmodic contractions promote continued bleeding. Mild cauterization of the denuded area cannot be expected to ensure absolute hæmostasis, nor can any other procedure other than actual ligation. Free bladder drainage and the catheter pressure are relied upon to control the slight bleeding from the operative site and in the majority of instances this is all that will be required. In the improved instrument provision has been made for a diathermy electrode which may be introduced into the sheath of the instrument and the bleeding points fulgurated under cystoscopic vision. The daily injections of a mild silver protein solution or mercurochrome are helpful in keeping the bladder clean and in hastening healing. In simple cases the indwelling catheter is removed on the third post-operative day, but is usually allowed to remain with repeated changes for seven to ten days before testing the effect of the operation. If the obstruction has been previously

adjudged to be too large for complete removal by a single operation, or if insufficient tissue has been removed at the initial sitting, the procedure may be repeated after an interval of ten to fourteen days.

The follow-up treatment has as its object the promotion of shrinkage of the gland, the continued subsidence of congestion, and the prevention of urinary sepsis. The bladder is catheterized intermittently over a period of three to four weeks in order to determine whether or not the obstruction has been suitably relieved and the necessity for a repeat operation to complete the cure. The prostatic and vesicular secretions are expressed, the massage thereby hastening the retrogression of the inflammatory process. If the patient remains well after six months, there is every likelihood that the cure will be lasting.

The danger of immediate and late complications is negligible. The operative mortality following 647 operations reported in a recent communication[5] was found to be 0.7 per cent, but only 0.3 per cent were directly attributable to the operation. Hæmorrhage sufficiently severe to attract attention was observed in only 13 cases in this series and with one exception responded satisfactorily to treatment. Chills and fever occurred but rarely and usually in patients who had pronounced pyelonephritis. Secondary hæmorrhage, phosphatic incrustation of the vesical neck, stricture formation, and urinary incontinence have never been observed following the application of the cautery punch operation. The incidence of epididymitis has been materially reduced since the adoption of bilateral vasoligation as a routine procedure. Sexual desire, if present, remained unimpaired.

In the most recently reported analysis of 137 cases,[5] supplementing a larger series of 510 collected in 1929,[3] 37, or approximately 50 per cent of the operations, were performed for the large prostatic obstructions usually consigned to major surgery. The operative results, verified by questionnaire and in many instances by actual observation, revealed that 77 per cent had been completely relieved of their obstruction; 15 per cent had been considerably benefited but required repeat operations to complete the cure; and but 8 per cent remained unimproved. The cures were observed for a period of from four to ten years in 38 patients, one to four years in 32, and the remainder for from one-half to one year following the application of the cautery punch resection. Among those in whom the results were incomplete the relief afforded in many instances had been sufficient to satisfy the patients and they could not be readily induced to return for completion of the cure. This analysis also revealed the interesting fact that, whereas in the past an average of 84 per cent had required multiple operations, only 70 per cent of the last series reviewed, comprising principally the larger obstructions, were subjected to a repeat operation. We attribute this diminution to the present practice of removing larger amounts of tissue at one sitting and believe that with the improved instrument not more than 25 or 30 per cent will require this procedure. A composite analysis of the 647 operations performed revealed complete cure in 85 per cent, with but few recurrences and uniformly durable results.

In conclusion, we urge the more universal adoption of this method for the treatment of prostatic obstructions, regardless of their size, by virtue of its demonstrated applicability with attendant freedom from complications and a practically negligible mortality rate. The operative results are uniformly consistent and beneficial and are in all respects comparable to those obtained by the radical operative procedures.

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SALMON OIL AND CANNED SALMON AS SOURCES OF VITAMINS A AND D.—The authors show that salmon oil can be produced which is equal to good grades of cod-liver oil in vitamin A content and approximately twice as potent as cod-liver oil in vitamin D. Commercial salmon oils now on the market show considerable variation in their nutritive value. Salmon oils have not been prepared particularly as a source of vitamins and the species of salmon used as a source of material will determine to a large extent the possible vitamin content of the oil. From the data obtained on vitamin D content of the oil in canned salmon, it is clear that there is more vitamin D in the canned salmon consumed in U.S.A. than in the cod-liver oil used for both human and animal feeding.—C. D. Tolle and E. M. Nelson, *Indus. & Engin. Chem.*, 1931, p. 1066.

# TRAUMATIC CHYLOTHORAX DUE TO INTRATHORACIC RUPTURE OF THE THORACIC DUCT

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CHYLOUS effusion into the pleural cavity is of infrequent occurrence; it is particularly rare as the result of chest injuries. Van Nuys,[1] in a review of the literature in 1931, found 66 cases of all types of chylothorax, including the case which he reported. Slightly less than half of these were due to obstruction of the thoracic duct by a malignant growth or by some chronic fibrotic process. The remainder were associated with severe contusions of the thorax or wounds at the base of the neck. Cases developing under these latter circumstances constitute so-called traumatic chylothorax. Most cases of traumatic chylothorax have been due to intrathoracic rupture of the duct resulting from severe injury of the chest.

The lymphatic system was first described by Asellius in 1627. Bartolet in 1633 gave the first account of a chylous effusion into the pleural cavities. Most classical writers do not mention chylothorax associated with traumatism, and, although there are several cases dating from the seventeenth and eighteenth centuries, the first authoritative case was reported by Quincke[2] in 1875, the literature on thoracic duct injuries dating from that time.

A summary of the cases of true traumatic chylothorax which have been reported up to the present time can be concretely presented in tabular form (Table I). In the literature there exists considerable confusion between injuries to the thoracic duct and cases in which such injury was associated with a chylothorax. In attempting to compile a complete record of cases of traumatic chylothorax, we find that up to 1912 Zesas[3] was able to collect 18 well authenticated cases which he reviewed in detail. Since that time 15 cases have been reported, making a total of 33 cases on record. Twenty-seven of these cases have been the result of severe traumatism of the thorax, with or without concomitant fractures of the ribs or vertebræ. Six have been due to a wound, usually at the base of the neck. Of the cases under review, fairly complete details were obtained in all but four.

The present case which we are reporting would appear to be the 34th on record of chylothorax of traumatic origin and the 28th due to thoracic injury other than wounds. Furthermore this is apparently the third case to be reported on this continent, the other two being those of Watts[14] and Andrews.[19] Most of the cases have been reported from Germany and France.

### REPORT OF CASE

J. N., a workman, aged 46, on July 30, 1931, while standing on a railing taking a door off a grain elevator fell a distance of eleven feet to the ground, striking his back upon a piece of lumber. The accident occurred about four o'clock in the afternoon. He was taken at once to the hospital at High River, Alberta, where he was attended by Dr. H. W. Soby. The temperature on admission was 99° F., the pulse 84, and the respirations 22. The man complained of pain in the back and chest. There was no initial shock of any consequence. There was no unconsciousness. Examination revealed nothing of note beyond contusions of the back. Roentgenograms of the spine and thorax showed no evidence of fracture. Moderate sedation was required for a day or so and the patient did not eat well. Although somewhat restless and uncomfortable, he improved, was able to sit up, and on several occasions went to the bathroom.

On August 5th, six days after the accident, he developed suddenly a condition which resembled shock—dyspnœa, sweating, cyanosis and extreme weakness. Temperature, 95° F., pulse 60 and thready, respirations laboured. On examination there was dullness over the right chest as high as the clavicle. Early the following morning the right thoracic cavity was aspirated and 1,750 c.c. of a white fluid tinged with pink were removed. In the afternoon 2,000 c.c. of fluid of a similar character were drawn off. The patient's condition improved somewhat and he was decidedly more comfortable. From that time on, however, he complained of pain in the right chest with increasing dyspnœa, which necessitated almost daily aspiration of the chest to give relief. On August 19th he developed intermittent fever to 101° F., which continued for two weeks, the pulse ranging from 84 to 96, and the respirations averaging 24. There appeared some slight general improvement, the principal symptoms being anorexia and weakness. Aspiration was necessary only two to three times a week. About September 6th, the condition became worse with an increase in the pain in the right chest and more pronounced asthenia. The patient was transferred to the Holy Cross Hospital, Calgary, on September 22nd.

From August 6th until September 22nd, a period of forty-eight days, 34,370 c.c., or nearly 35 litres, were removed from the right pleural cavity. The character of the fluid remained constant. Careful examination of this fluid, the details of which are discussed in a sub-

sequent section, showed it to be true chyle. Urinalysis was always negative. The blood Wassermann test was negative.

The principal clinical features on examination on September 22nd were the marked asthenia, the loss of weight, and the pleural effusion with some displacement of the heart to the left. The blood pressure was systolic 92, diastolic 70. The red blood count was 4,992,000, the hæmoglobin 80 per cent; the white blood count 47,200, with 90 per cent polymorphonuclears. The blood non-protein nitrogen was 39.8 mg. per 100 c.c. and the blood creatinine 1.2 mg. per 100 c.c. Therapeusis consisted in a high caloric diet composed almost entirely of carbohydrate and protein, together with circulatory stimulants.

On September 24th, as it was becoming very difficult to obtain fluid on aspiration of the chest, a thoracotomy was done, one rib being resected. About 1,000 c.c. of chyle and large masses of coagulum were evacuated. There was a steady downhill course in spite of a good appetite and of food in considerable excess of caloric requirements. Malnutrition and weakness became more marked and death occurred on October 3rd from cachexia and extreme asthenia.

*Necropsy.*—Only the significant findings will be reported. The body was emaciated and showed marked loss of muscle tone. The pleura over the right lung was thickened and adherent. The right lung was compressed upward and medially. The lower third of the pleural

TABLE I

SUMMARY OF CASES OF TRAUMATIC CHYLOTHORAX FROM THE LITERATURE

A. DUE TO THORACIC INJURIES AND CONTUSIONS

| | *Author* | *Year* | *Nature of trauma* | *Result* | *Remarks* |
|---|---|---|---|---|---|
| 1. | Diemerbroeck | 1685 | Kicks in a brawl | Died | Autopsy showed ruptured duct. |
| 2. | Quincke | 1875 | Run over by wagon | Died | Fractured ribs. Right chylothorax. |
| 3. | Kirschner | 1885 | Blow on thorax | Recovered | Right chylothorax. |
| 4. | Krabell | 1885 | Run over by wagon | Died | Fractured 9th thoracic vertebra. Right chylothorax. |
| 5. | v. Thaden | 1887 | Fall 80 feet from mast | Died | Fractured ribs. Right chylothorax. |
| 6. | Helferich-Port | 1894 | Blow on thorax | Recovered | Right chylothorax. |
| 7. | Hennssen | 1897 | Crushing of thorax | Recovered | Bilateral chylothorax. |
| 8. | Hahn | 1899 | Run over by wagon | Died | Injury 10th thoracic vertebra and fractured ribs. Right chylothorax. |
| 9. | Handmann | 1899 | Crushing of thorax | Recovered | Fractured ribs. Left chylothorax. |
| 10. | Handmann | 1899 | Blow on thorax | Recovered | Left chylothorax. |
| 11. | Legg | 1899 | Run over by wagon | Died | Fracture of rib. Bilateral chylothorax. |
| 12. | Lindstrom | 1905 | Blow on chest | Died | Fracture of 8th rib. Left chylothorax. |
| 13. | Hammesfahr | 1907 | Chest injury | Recovered | Bilateral chylothorax. |
| 14. | Oeken | 1908 | Crushing injury of thorax | Died | Right chylothorax. |
| 15. | Slajmer | 1912 | Fracture left clavicle | Recovered | Left chylothorax. |
| *16. | Bohne-Lauenstein | No date | Fall from mast | Died | Fractured ribs and vertebræ. Incomplete rupture of aorta. Right chylothorax. |
| 17. | Derganz[4] | 1915 | Chest injury | | |
| 18. | Etienne (unpublished case quoted by Lejeune.[5]) | | | | |
| 19. | Frohmann (quoted by Lejeune.[5]) | | | | |
| 20. | Brekke[6] | | | | |
| 21. | Malone and Wardrop[7] | 1919 | Fall from mast | Died | Right chylothorax. |
| 22. | Lindenfeld (quoted by Grimault.[8]) | 1919 | Trauma to chest | Recovered | Right chylothorax. |
| 23. | Ceelen (quoted by Grimault.[8]) | 1923 | Trauma to chest | Died | Right chylothorax found at autopsy. |
| 24. | Lindenberg[9] | 1926 | Crushing of thorax | Recovered | Bilateral chylothorax. |
| 25. | Grimault[8] | 1928 | Automobile accident | Recovered | Right chylothorax. |
| 26. | Andrews[10] | 1929 | Crushing of thorax | Died | Right chylothorax. |
| 27. | Paitre[11] | 1929 | Automobile accident | Recovered | Fractured rib. Left chylothorax. |

B. DUE TO WOUNDS

| | *Author* | *Year* | *Nature of trauma* | *Result* | *Remarks* |
|---|---|---|---|---|---|
| 1. | Dietze | 1903 | Bullet wound of chest | Recovered | Right chylothorax. |
| *2. | Bohne-Lauenstein | No date | Bullet wound base of neck | Died | Left chylothorax. |
| 3-4. | Elliott and Henry[12] 2 cases | 1917 | Gunshot wound of thorax | One recovered One died | Both left chylothorax. |
| 5. | Drey[13] | 1920 | Gunshot wound base of neck | Recovered | Right chylothorax. |
| 6. | Watts[14] | 1921 | Suicide wound base of neck | Died | Bilateral chylothorax. |

* Above cases reviewed in detail by Zesas.[3]

space was occupied by a well defined cavity which extended to the vertebral column posteriorly and was continuous with the posterior mediastinum. A smaller cavity, about the size of a hen's egg, was located over the body of the tenth dorsal vertebra, in the posterior mediastinum, and was connected with the larger cavity. The walls of the main cavity were about one-eighth of an inch in thickness. The cavity contained partially organized material, which was composed of thin white chylous fluid and masses of coagulated chyle and fibrin resembling large milk curds. Medially, the wall of the cavity was continuous with a mass of low grade inflammatory tissue which occupied the lower third of the posterior mediastinum. The remainder of the thoracic contents was normal with the exception of the pericardial cavity, which contained about 60 c.c. of straw coloured fluid, and presented a few adhesions about the base.

The thoracic duct was exposed throughout its entire length. Near the lower border of the tenth dorsal vertebra, the duct was ruptured and at this point was connected with the small cavity above described. The duct was injected at the receptaculum with methylene blue, the solution flowing into the smaller cavity. The duct was otherwise patent throughout, no tubercles or other masses being evident.

Further dissection failed to reveal any fracture or dislocation of the vertebral column at or about the level of the rupture of the thoracic duct. The tenth dorsal vertebra, however, was prominent anteriorly.

## THE ETIOLOGY OF CHYLOTHORAX

There are many causes of chylous fluid appearing in the pleural cavities. These are set forth in Table II. Most cases have been due either to trauma, in which there occurs a rupture of the thoracic duct or its radicles, or to new growths causing increased pressure within the duct leading to backward flow of lymph along the pulmonary and pleural lymphatics or to actual rupture of the duct itself. The cases of greatest interest are those in which the cause is a major crushing or closed injury, with or without damage to the thoracic cage. In the case under review the external violence resulted from a fall, the patient falling a distance of eleven feet from the wall of a grain elevator. A number of cases have been reported in which the thoracic duct has been cut during an operation in the left cervical region. In some cases the entire duct has been cut across; in others, where the duct joined the subclavian vein by the so-called delta termination, only a few of the radicles have been severed and thus there was not complete interference with the chylous circulation.

In brief, it would appear that of the approximate number of 66 cases of chylothorax in the literature (Van Nuys[1]) 33 or 50 per cent were traumatic in origin. A number of cases have shown an associated chylous ascites, but this observation has not been made in any case due to trauma.

TABLE II

CAUSES OF CHYLOTHORAX

I Trauma.
- (1) External violence:—
  - (a) Closed trauma—no external wound and no fracture; falls from a height; automobile passing over the body; crushing between cars; rocks falling on the back; a swing striking the body.
  - (b) Trauma with fractured ribs, clavicle or vertebræ.
- (2) Operative wounds:—
  - (a) Duct completely severed.
  - (b) One or more terminals cut.
- (3) Gunshot wounds.
- (4) Self-inflicted or stab wounds.

II New growths and granulomata.
Carcinoma; lymphosarcoma; tuberculous glands.
III Thrombosis of the left subclavian vein
IV New growth of the duct itself.
V Perforating lymphangitis.
VI Aneurysm of the duct.
VII Cirrhosis of the liver.
VIII Filaria.

## ANATOMICAL AND PHYSIOLOGICAL ASPECTS

The thoracic duct carries the chyle from the villi of the small intestine directly into the blood by way of the subclavian vein; it also collects the lymph of the entire body, with the exception of the right upper half which is served by the right lymphatic duct. The current of the chyle is probably controlled by the respiratory movements, which with inspiration draw the fluid into the thoracic portion of the duct.

The diameter of the duct is about that of a wheat straw. It begins at the receptaculum chyli which is an expansion of the lower end of the duct lying upon the second lumbar vertebra behind the aorta. Its walls are very thin and elastic. It passes through the aortic opening of the diaphragm to the right of the aorta and lies to the right of that vessel throughout almost its entire course. Passing behind the aortic arch and the œsophagus, it swings to the left in the superior mediastinum, curves around the subclavian artery, and empties into the subclavian vein or the internal jugular vein near their junction. In about 50 per cent of the cases the duct has one opening into the vein. Wendel in 17 observations found a double termination in 3, triple in 1 and multiple in 4. Parsons and Sargent, tabulating 40 observations, found multiple openings in 18 cases, or a little less than 50 per cent. Lilienthal[15] points out the possibilities of collaterals and anastomoses throughout the course of the duct as well as in the terminal portion.

These anatomical features explain partially, at least, certain differences in the clinical course of thoracic duct injuries. We have already noted that in some cases where the terminal portion of the duct has been cut only a portion of the chyle escapes, due probably to the fact that only one or two radicles of a multiple termination have been severed. Similarly, the generous system of collaterals and anastomoses that sometimes is found throughout the entire course of the duct is probably responsible for the fact that about 50 per cent of the cases with a traumatic rupture of the duct recover.

In the majority of cases of chylothorax, the chyle is found in the right pleural cavity. In one series of 17 cases the right side was involved in 10, the left side in 4, and both sides in 3. In a series of 24 cases reviewed by Lenormant[8] (in his discussion of Grimault's case) the right side was involved in 13, the left in 6 and both in 5. In our review of the literature covering 28 cases of traumatic chylothorax, 15 were found on the right side, 8 on the left, and 5 were bilateral (Table III). This preponderance of right-sided involvement can probably be accounted for by the fact that in the lower two-thirds of its course through the thorax the thoracic duct is nearer the right side, with the stout aorta forming a barrier to the left.

It has been assumed by some authors that following rupture of the duct the chyle escapes into the posterior mediastinum and passes through the endothelial spaces into the pleural cavity. Fay[16] thinks it far more probable that the fluid finds an easier way through a tear in the pleura which occurs at the time of the accident. In our case the mode of extension was readily demonstrated, when a solution of methylene blue was injected into the duct near its origin and could be followed in its course to a definite opening into the pleural cavity. In explaining the mechanism of the rupture of the duct it can readily be seen how this may be caused by a fragment of bone, a hypertrophic spur, or a crushing fracture of a vertebra. In the absence of any such anatomical factor it is more difficult to understand what occurs. Probably at the time of the accident there is a defence reaction which is essentially an exaggerated lordosis causing hypertension and rupture of the duct. Under such circumstances the tension may further be increased by physical exertion or vocal effort. Grimault[8] points out the fact that rupture is more apt to occur after a heavy meal when the duct is distended with chyle. In the present case the lumbar curve appeared to start at the tenth dorsal vertebra, which was unusually prominent but showed no evidence of fracture. It is possible that in the fall the spine was unusually hyperextended at this point, stretching the duct until it ruptured.

### CLINICAL FEATURES

In the clinical picture the most striking feature is the silent period that elapses between the time of the accident and the appearance of sudden cardiac and respiratory embarrassment. The average time in the cases so far reported has been a period of four days. In the present case the onset of the acute phase occurred on the sixth day. There is no one symptom characteristic of the case in this early period, the picture usually being dominated by the symptoms associated with the accident. The second phase which usually coincides with the appearance of the chylothorax is in most cases ushered in abruptly. The patient exhibits marked dyspnœa, a rapid thready pulse, pallor, cold sweat and all the signs of profound shock. The physical signs in the chest are those of a simple pleural effusion and need not be detailed. When the fluid is aspirated, which is usually necessary to relieve the distress, the diagnosis is evident from the character of the fluid.

Two other features are striking. The first is the rapid reaccumulation of the fluid, sometimes necessitating aspiration twice in twenty-four hours. The other is the progressive weight loss and marked asthenia associated with the lymphorrhœa. The patients usually fail rapidly and death is due to exhaustion and emaciation. The urine may or may not be scanty and in some cases the patient complains of thirst.

The diagnosis depends upon the character of the fluid and the fact that it rapidly reaccumulates. In an accident case developing pleural effusion, unaccompanied by fever, associated with scanty urine, hunger and thirst, and without evidence of anæmia, a diagnosis is suggested, particularly when there is a latent period between the time of the accident and the onset of the symptoms. It is always necessary to differentiate the condition from a hæmothorax.

A few points of interest in cases of traumatic chylothorax deserve separate consideration.

The location of the chylothorax and the nature of the associated thoracic injury are noted in Table III. The most striking feature in the clinical history, as we have already noted, is the period of time that elapses between the initial injury and the onset of the effusion with its associated symptoms. This period is usually from two to five days. In the present case it was six days. Apparently the effusion never occurs immediately. Every case on record in which this point is mentioned showed a latent period after the injury with an abrupt onset of dyspnœa, pain, and signs of respiratory and cardiac embarrassment, at which time examination showed the presence of an effusion. In Lindenberg's case this occurred 3 days after the accident, in Andrew's case on the 6th day, in Dietz's case on the 10th day, in Hahn's the 15th, and in Grimault's case the first puncture was not necessary until the 50th day. It is difficult to explain this latent period. Even after a study of the exact state of affairs as evidenced at post-mortem it is impossible to formulate a hypothesis adequate to account for such a sequence of events.

TABLE III

*Location of Chylothorax*

Right side, 15; left side, 8; bilateral, 5.

*Nature of Thoracic Injury.*

Gunshot wound, 5; cut wound, 1; fracture of vertebræ, 1; fracture of ribs or clavicle, 6; fracture of ribs and vertebræ, 2; blow on thorax (contre-coup), 13.

These figures are based upon 28 cases in which there were available data on the above points.

Still more difficult of explanation is the occurrence of what is virtually a condition of shock coincident with the appearance of the effusion. In the present case the patient was able to walk about the ward, when he was suddenly seized with all the symptoms and signs of profound shock. The effusion in his right pleural cavity at this time could not have been more than two quarts. Most of the cases on record have shown this same phenomenon. Paitre[11] states that the abrupt onset and the gravity of the symptoms suggest a condition resembling anaphylactic shock. Lecéne, in discussing the case reported by Paitre,[11] believed that such a disturbance was due to a sudden protein intoxication as the result of massive resorption into the pleura of the lymph suddenly discharged into the pleural cavity. In our own opinion the resemblance between this condition and that developing as the result of spontaneous pneumothorax is suggestive. One could account for the degree of shock on the basis of an abrupt disturbance of the pressure relations existing in the thoracic cavity with partial collapse of the lung due to the sudden release into the pleural space of chyle which previously had been pocketed in the para-pleural tissues.

A characteristic of traumatic chylothorax is the large quantity of the effusion. In several cases the dressings and the bed were soaked continuously. In Dietze's case 27 litres were aspirated in 31 days; Hahn aspirated 29 litres during the life of the patient and removed another 7 litres at post-mortem, all in the course of three weeks. Quincke aspirated 20 litres in ten days. On the other hand in some cases the amount of effusion has been small. In Paitre's case only 300 c.c. were aspirated and ten days later the effusion had disappeared. In the present case nearly 35 litres were removed in the course of 48 days. After thoracotomy was done it was impossible to estimate the amount of the effusion which continued to form. Our case did not exhibit the severe thirst and the decreased urinary output which some observers have recorded.

TABLE IV

ANALYSIS OF FLUID

and comparison with the chylous fluid as determined in an average of 10 cases compiled by Bradbury[17]

| | *Present case* | *Chylous fluids* |
|---|---|---|
| Specific gravity | 1.017 | 1.017 |
| Reaction | Alkaline | Alkaline |
| Solids | 10.85 | 7.04 |
| Protein | 5.68 | 3.9 |
| Serum albumin | 2.82 | 0.1 |
| Serum globulin | 2.84 | 0.04 |
| Fat | 3.7 | 1.58 |
| Cholesterin | 0.12 | 0.26 |
| Lecithin | 0.62 | — |
| Glucose | 0.007 | 0.11 (variable) |
| Salts | 0.83 | 0.81 |
| Manner of collection | Rapid and amounts large | Rapid and in large amount |
| Colour | Yellowish white | Yellowish white |
| Opacity | Lactescent | Lactescent |
| Odour | None | None |
| Microscopic cells | Few lymphocytes and polymorpho-nuclears | Very few cells |
| Microscopic fat | Many fat globules which stain with Sudan III and are ether soluble | Invariably present |
| Cream layer | 10 per cent of content | Usual |
| Sediment | Few red blood cells | None |

A notable feature was the finding at post-mortem of large masses of yellowish curdy clot filling the lower half of the right pleural cavity. If the patient had survived, it probably would have been necessary to open the thorax and remove this material to ensure proper expansion of the lung. A similar observation was made by Elliott and Henry[12] in one of their cases.

### CHARACTER OF THE FLUID

The detailed analysis of the fluid which was obtained from the pleural cavity on repeated occasions is presented in Table IV. For purposes of comparison we have arranged in parallel fashion the average determinations of 10 cases showing chylous effusion compiled by Bradbury[17] from reported cases of Wallis and Scholberg.[18] There is a close approximation between the two groups of figures.

The recovery of a milky fluid from a serous cavity does not necessarily imply admixture with chyle. In some instances the milky opacity is not due to fat or an ether-soluble substance, and no lesion involving the thoracic duct or its radicles can be demonstrated to account for an escape of chyle.

Pleural effusions of a milky character are of two varieties: (1) true chylous, in which there is chyle and an associated lesion of the thoracic duct; (2) pseudochylous (chyliform or chyloid) in which there may be emulsified fat from cells undergoing fatty degeneration, but in which the opacity is due mainly to a lecithin-globulin complex held in suspension by inorganic salts. Such an effusion is usually associated with tuberculosis or malignant disease with no involvement of the thoracic duct.

The characteristics of the two varieties of effusion have been carefully studied by Wallis and Scholberg.[18] They regard the distinctive features between the two as being the specific gravity, the presence or absence of highly refractile granules, the amount of fat, the amounts of lecithin and globulin and the rate of accumulation of the fluid. Chylous fluid does not coagulate and resists putrefaction; on standing a creamy layer of fat forms; the specific gravity is over 1.012; there are many microscopic fat globules which are soluble in ether; the fat content is high; the fluid accumulates rapidly in the serous cavity necessitating frequent withdrawal of large amounts. In contrast, pseudochylous fluids have a specific gravity under 1.012; a low fat-content averaging 0.3 per cent; usually there is no microscopic fat and no cream layer; the fluid collects slowly. It should be emphasized that differentiation between the two types of fluid is sometimes difficult, and a complete chemical examination, with a knowledge of the underlying pathological condition, is necessary before one can conclude that the material is true chylous fluid. In the present case the high specific gravity, the presence of fat and particularly the rapid accumulation of the fluid pointed to the effusion being of a chylous character. Each sample remained incoagulable and showed a thick cream layer. Culture of the fluid yielded no growth.

### METABOLIC ASPECTS

Fundamentally we are ignorant of the basic physiology of traumatic effusions of chyle. The marasmus which develops rapidly and terminates fatally raises many problems with regard to the absorption and utilization of food and with respect to metabolism in general. The primary fact would seem to be that interference with the thoracic duct so that the materials which it normally transports fail to reach the blood stream produces a condition of progressive emaciation leading to death. Experimentally this has been demonstrated by Sir Astley Paston Cooper (quoted by Smith[19]), who found that when the thoracic duct of dogs was divided and the chyle permitted to drain into the tissues, the animals died in from four to ten days. Clinically, the disease picture has been described by many observers (Cushing,[20] Treves). The significance of this sequence of events still eludes us. The loss of weight is more than can be explained by the loss of chyle. In the present case the caloric intake, as represented by carbohydrate and protein, was at least ample to meet the basal requirements of the patient while at rest in bed, and yet rapid emaciation and a condition indistinguishable from the cachexia of malignancy ensued. Is this state of affairs due to the virtual removal of fat from the diet, or to the toxic effect of chyle accumulating in the tissues, or to an intoxication resulting from an interference with the lymphatic circulation of the greater portion of the body? Is the disturbance due to a breakdown in lipoid metabolism having to do with lecithins, choles-

terin and its esters? The problem is a complex one and we are forced to admit that at the present time there would seem to be no adequate physiological explanation of these phenomena.

## PROGNOSIS

The prognosis of traumatic chylothorax is unquestionably grave. The causes of death are immediate and remote. The immediate cause is suffocation and cardiac failure. The effusion of chyle into the pleural cavity is of rapid development encroaching upon the lung tissue, at the same time increasing the intra-thoracic pressure to the point where extreme cardiac embarrassment develops. When death is postponed, it is then due to malnutrition and inanition, through the loss of nutrients normally carried to the subclavian vein by the thoracic duct. Lindenberg,[9] in his article in 1926, states that the prognosis is favourable and quotes 10 per cent as the mortality. While this may apply to all cases of injury to the thoracic duct, it would appear to convey a wrong impression so far as definite cases of traumatic chylothorax are concerned. Grimault[8] in 1928 states that the prognosis in traumatic cases is serious. Reporting on 25 cases, he found that 12 died and 13 recovered. Of 24 traumatic cases reported by Zesas,[3] 12 recovered and 12 were fatal. This agrees quite closely with our own review of the subject. In 30 definitely traumatic cases in which we have details and which are reported in Table I there were 16 deaths and 14 recoveries. The recorded mortality in traumatic chylothorax therefore is in the neighbourhood of 50 per cent. This is in contrast to a mortality of 10 per cent in cases of operative injury to the thoracic duct as noted by Zesas[22] in a review of 49 cases.

## TREATMENT

A discussion of the treatment of intrathoracic wounds of the thoracic duct with complicating chylothorax must be largely speculative, as no general rules have been established. The repair of such wounds is beyond the present skill of surgery and treatment as a consequence is in the main supportive. There are however certain therapeutic measures which may be employed to advantage. The first is the aspiration of the fluid from the pleural cavity, which should be done only as an emergency measure and not repeated until necessary to relieve distressing symptoms. The chyle in the duct is under low pressure and is more or less prevented from leaking from the wound in the duct by the increase in intrathoracic pressure. As the withdrawal of the fluid creates a negative pressure in the thorax and thus stimulates the flow of chyle from the duct, it has been suggested that thoracotomy should be performed, thus creating a continuous positive pressure. This indication would appear to present itself when aspiration becomes too frequent or fails to relieve symptoms. In certain cases large clots or masses of grumous material form in the pleural cavity and the necessity of removing these masses constitutes a further indication for thoracotomy.

As the patient continues to fail even in spite of the consumption of large amounts of carbohydrate (possibly indicating that the chylous fluid contains some vital enzyme or hormone not yet discovered), several writers have suggested, and Oeken[21] has actually tried, the introduction into the venous circulation of a part of the chylous fluid aspirated from the pleural cavity. While there are few observations on this procedure, its trial in the hands of Oeken was not successful. As general therapeutic measures, fats should be eliminated from the diet and carbohydrate given in large quantities. Water should be given freely and the patient kept as comfortable as possible. Hall and Morgan[23] suggested that in order to secure absolute physiological rest, rectal feeding should be employed exclusively, absorption then taking place by way of the colonic lymphatics and thence into the general superficial lymph channels instead of through the lacteal system. It is difficult to see how this procedure spares the thoracic duct to any extent and its efficacy has not been borne out by the experience of others.

The success of any form of treatment would seem to be entirely dependent upon the presence of adequate collateral channels in the thoracic course of the duct. If a collateral circulation is eventually established, spontaneous recovery will probably take place. In other respects effective therapeutic measures in the treatment of chylothorax have still to be evolved.

SUMMARY

A case of traumatic chylothorax is reported. A review of the literature shows 33 well authenticated cases already on record.

In common with previous reports, this case showed a latent period between the time of the accident and the onset of the chylothorax, rapid reaccumulation of large amounts of fluid in the pleural space, and progressive cachexia.

Traumatic chylothorax raises physiological and metabolic problems which have no satisfactory explanation at the present time.

A detailed analysis of the chylous fluid is presented.

We wish to express our appreciation to Dr. H. W. Soby, of High River, who had this patient under his care during the greater part of the illness. We are also indebted to Prof. George Hunter, of the Department of Biochemistry, University of Alberta, for the analysis of the chylous fluid.

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# A PLEA FOR EARLY COMPRESSION IN PULMONARY TUBERCULOSIS*

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THE conception of adult pulmonary tuberculosis in the 19th century and the early part of the 20th century held that this disease was an extension or a lighting up of an old apical infection. The continental pathologists Naegeli[1], Burkhardt[2], and others found that 90 per cent of all city dwellers at autopsy had tuberculous lesions at one or both apices. These lesions showed more or less completely healed areas of tuberculosis, surrounded by collapse indurations and fibrosis of the parenchyma. Many tubercles still contained caseous foci with tubercle bacilli. These lesions are quite distinct anatomically and pathologically from the discrete primary foci found scattered throughout the lungs—the remnants of childhood infection. They are true manifestations of re-infection. It was thought that the endogenous extension downwards from the apex was accomplished by or through the rupture of lymph nodes near the old focus, retrograde lymphatic stem, or by the hæmatogenous or aerogenous routes. Adult disease was thought to be just an advanced stage of this early "incipient" apical infection or an acute exacerbation of this stage. The observations of Ewart[3], Dunham[4,5], Gekler[6], Redeker[7], Wessler[8], and Assmann[9,10], have altered this conception, although it is still held by some pathologists, such as Loeschke[11]. The old apical disease is now thought by most to be more or less harmless, (7 per cent Braeuning[12],) and that the adult disease, as seen by x-ray, is usually a sub-clavicular pneumonic infiltrate of greater or less extent in the 1st, 2nd, 3rd or 4th interspaces, and located in the posterior part of the upper lobe or the apex of the inferior lobe, above the hilus, and most frequently at the periphery of the lung. This infiltrate, which may appear suddenly shows little or no discoverable anatomical relationship to the old apical disease, and is often in its early form relatively small before advanced spread occurs and discloses its presence by constitutional symptoms. The x-ray, and less frequently the stethoscope, is often the only means of its discovery if constitutional symptoms of intoxication are slight or absent. This subclavicular patch of broncho-pneumonia is an acute form of re-infection in an allergic individual. It is often as acute a disease as non-tuberculous broncho-pneumonia. In its early form it may be entirely cured or absorbed if given proper treatment. If treatment is withheld, it tends in most to sluggish progression, instead of resolution, but in others may advance very rapidly, with cavity formation and extension to other parts of the lung.

Whether or not this acute re-infection is of exogenous or endogenous origin, this newer con-

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ception of phthisis as frequently an acute disease and in its early appearance most often unilateral has altered our ideas of treatment. If this new disease was simply an acute exacerbation of a slow apico-caudal spread of an old "incipient" lesion of years' duration, then prolonged rest for a period of a year or more would seem to be a reasonable procedure to allow the acute exacerbation to subside. Little hope could be held out that the disease would be completely cured—it would merely be held in check; once tuberculous, always tuberculous. The advent of the x-ray has shown that this patch of small tuberculous pneumonia is a new and fresh re-infection, and if properly and promptly treated may be absorbed, leaving only a few strands of fibrosis behind, or that after artificial pneumothorax treatment many lungs will be as clear of disease as if they had never been invaded. Tuberculosis can be cured, not only clinically but often anatomically, if properly treated in its early acute stage. The idea of the chronic nature of this disease has arisen from the evidences that the body shows in its prolonged efforts to repair the damage of the acute stage. This new conception of the acute development and often rapid advancement of adult pulmonary tuberculosis has stimulated more active and aggressive treatment in the early infiltrate stage to hasten fibrosis, to prevent extension, and to limit cavity formation.

The treatment of pulmonary tuberculosis involves two problems. The first is that of the infected individual, regarded as a whole, acting and reacting in his social and physical environment, and the second, the reaction of that individual's body, and more particularly his lungs, to the presence of the tubercle bacillus. The tubercle bacillus may be considered, as it truly is, just another factor in the environment of man, impinging on him, causing certain changes in his body and modifying its behaviour. The first problem then becomes chiefly an economic and social one, and the second, a physiological and immunological one. In the final analysis they are mutually reactive and inseparable. Trudeau well said, "There is a rich man's tuberculosis and a poor man's tuberculosis. The rich man recovers and the poor man dies." This succinctly expresses the close embrace of economics and pathology. Any scheme to cure this disease which does not consider man as a whole, as the resultant of environmental strain and stress, is bound to fail. Tuberculosis is not merely a disease of the lungs; it is a profound change of the entire body which occurs when man, regarded as an organism acting under the dictation of, and the product of, his environment, fails to circumnavigate or subjugate certain injurious forces acting on his body and mind. Let him persist in continuing in such an environment and he will die. Change these factors, both external and internal, readjust the scene, if not the stage, and he, in the majority of instances, will recover. The sanatorium with its bed rest, fresh air, and good food, is such an external environmental change. The second requirement is to alter the local environment of the tubercle bacilli, and this change is most quickly and effectively obtained by collapse therapy. In the case of a man acutely infected with the tubercle bacillus, activity in his daily struggle to adapt himself to his social and economic environment is almost invariably followed by a coincidental activity of the disease. Rest in the first direction is followed by arrest in the other.

Tuberculosis is commonly regarded as a chronic disease. This only means that the tuberculous takes an unconscionably long time in dying. Did the lung, alas, not "suffer in silence," but did it protest more vigorously, tuberculosis, like syphilis, would be treated in the first acute stage with a high hope of cure, and we would not await the development of the second or third stages, when a satisfactory result is difficult and sometimes impossible. These early lesions are not infrequently missed by a physical examination and a stethoscope. They will be discovered through a careful history and an x-ray film.

Early pulmonary tuberculosis is of all so-called chronic diseases the easiest to cure. The remedy is *rest.* Dr. John Flinn, has well called this the "specific treatment." Pulmonary tuberculosis shows an inherent tendency, a willingness for recovery, which when considered beside chronic heart, kidney or liver diseases, which show little or no tendency to cure, makes it unique among the diseases of long duration afflicting man. Given half a chance, pulmonary tuberculosis will meet the physician half-way towards recovery. Our sanatoriums are filled to-day with the incurable sequelæ, the deplorable after-results, the uncollapsible cavities, the avoidable complications of what was once, for many patients, an entirely curable disease in the early stage. The incurable tuberculous who will fill our sanatoriums for the next five years are now walking the streets, working at desks or machines with early curable tuberculosis, and

coming into doctors' offices with loss of appetite, loss of weight, tiredness, and are getting bottles of medicine for their stomach complaints or tonics for their fatigue. They eventually will come to the sanatorium with moderately or far advanced disease with cavitation. We, as a people, can get rid of tuberculosis, when once we make up our minds it is worth while to spend enough money to do so. Better education of doctors, public education to the point of phthisiophobia, enforced periodic physical and x-ray examinations, early diagnosis, early bed-rest, early compression, isolation and protection of the young are our remedies.

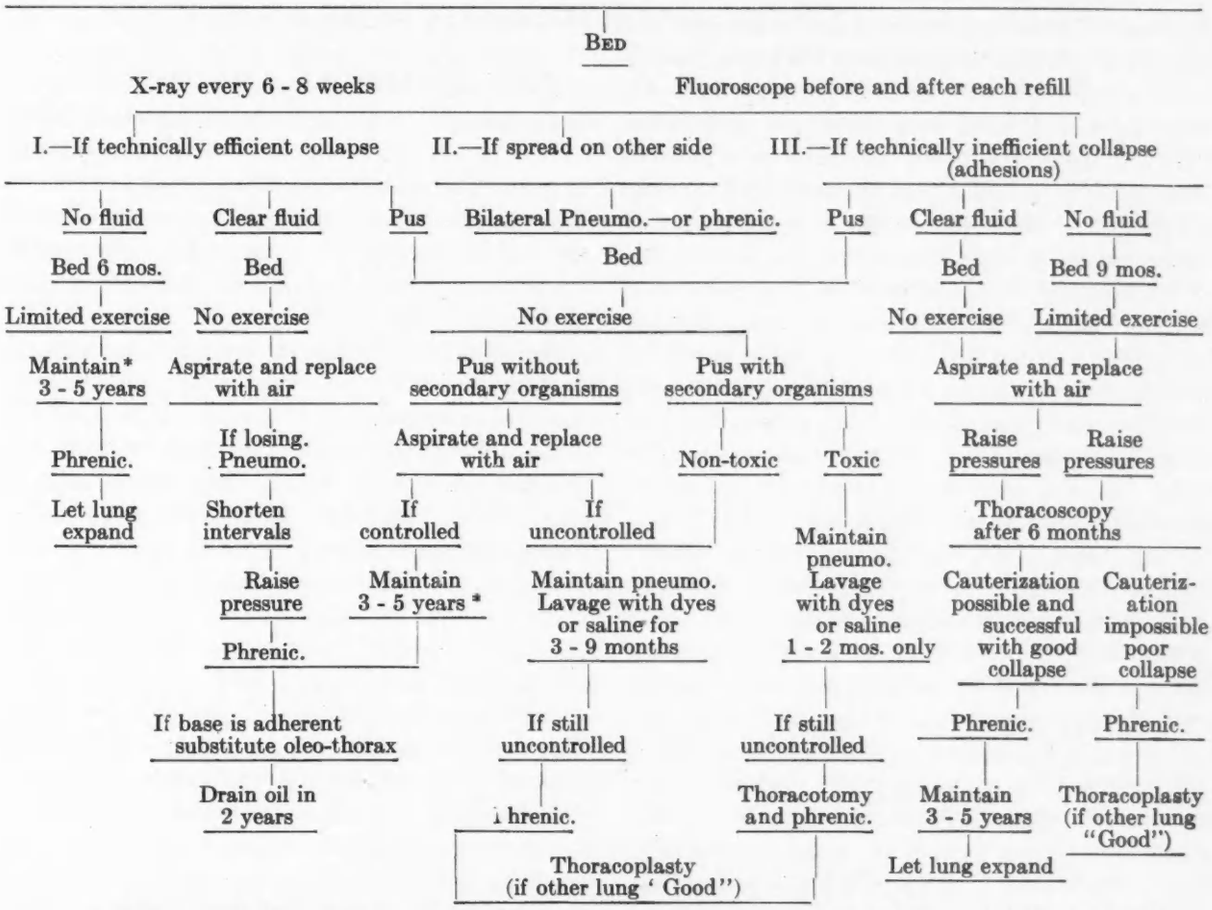
We, as physicians, can do but little to change the external environmental forces which predispose to re-infection. Poverty, poor food, unsanitary surroundings, contact with infectious foci, overwork, and mental strain are mostly beyond our control. Those essential and radical readjustments are problems for the sociologists and economists. We produce in a sanatorium, for a few short months, a new and harmonious environment and attempt to counteract years of disharmony and maladjustment. All the more reason, since the time is so short, to take advantage of these months by actively altering the local environment of the bacillus in the diseased lung by collapse therapy. Rest, either physiological or so-called mechanical, will not by itself cure the disease; it merely induces local conditions favourable for the re-establishing of the body's defensive mechanism, those mysterious and incalculable elements, the sum total of which are called resistance. Once resistance has been built up it must be carefully protected. This preservation of resistance is the chief problem of rehabilitation and its watchword is "The Fatigue Conscience." It is thus seen that there are three acts to the drama; the first, the predisposing environment and the onset of the acute re-infection; the second, the temporary change of this injurious environment in the sanatorium, with an active attempt to enforce lung relaxation; and the third, the readjustment to the external environment after the sanatorium. The first and last are the important ones and the most difficult problems in the treatment of this disease.

Until that happy day breaks when the immunologist and serologist solve the problem of how to prevent invasion and, once invaded, to destroy in vivo the tubercle bacillus, the phthisiotherapist is forced to adopt the mechanistic viewpoint in the treatment of this disease. This is no new idea. It was suggested by William Carson, of Liverpool, in 1821, who said in part—"It has long been my opinion that if this disease (phthisis) is to be cured, and it is an event of which I am by no means disposed to despair, it must be accomplished by mechanical means, or in other words by a surgical operation." He urged artificial pneumothorax and other collapse procedures. While this mechanical viewpoint is a confession of failure to treat this disease directly, while some of the procedures advocated are clumsy, crude, and often dangerous, yet lung relaxation and lung compression must be accepted to-day for want of something better. That partial or complete respiratory immobilization will hasten absorption and induce fibrosis in a lung invaded by the tubercle bacillus faster and more surely than any other procedure is the outstanding fact we know about the treatment of this disease. The treatment of pulmonary tuberculosis to-day is the treatment of neglected cavities. The remedy is earlier diagnosis and earlier compression.

Burrell,[13] writing on "The Future of Artificial Pneumothorax Treatment," states "If artificial pneumothorax can save the lives of many patients who have failed to improve under other treatment, how many more would it save if employed in the earliest stage before adhesions have formed and while the disease is unilateral? I think that in the near future all early cases of unilateral disease will be treated by pneumothorax unless there is some definite contraindication. When once crepitations are heard the case cannot be regarded as in the early stage, and certainly pneumothorax should be advocated. It is only a waste of time to try other methods, because, although it is true some do well, many do not, and even those who do well at first are very liable to relapse."

The treatment of pulmonary tuberculosis with cavities is a surgical problem; not that surgical procedures (and artificial pneumothorax is here included) are immediately indicated in every case, but I feel strongly that surgery for cavities and for lesions which will in all probability develop cavities later is nearly always indicated. The decision whether or not, and when, to invoke surgical rest is one of the most difficult in the whole realm of modern therapeutics and demands the highest form of clinical judgment and experience. There are only two contraindications, and only one of these is absolute. The first is the rapidly spreading, toxic, terminal and hope-

SUMMARY OF THE MANAGEMENT OF UNILATERAL PNEUMOTHORAX—OTHER SIDE GOOD OR FAIR




*The reply of Rist of Paris, to those patients who complain of the length of time required for Pneumothorax Treatment is "Yes, it takes longer than it does to die of tuberculosis."

less bilateral disease; and the second is the minimal or, occasionally, the moderately advanced disease without cavitation which is showing marked evidence of rapid absorption, healing or fibrosis under absolute bed-rest, where the affected person can afford the time and the money to carry on for an indefinite period with the confident assurance of complete restoration of health at the end of several years of rest. All others, the pre-cavernous and the frankly cavernous, should have some form of active collapse therapy.

Some of the same objections are being raised to-day against active treatment for early pre-cavernous and frankly cavernous tuberculosis which were raised at the beginning of the century against operations for appendicitis. Optimism as to the outcome in cavity cases when treated conservatively is not only fatuous but unjustifiable. That many cases will recover and a few cavities close without surgical intervention no one will deny, but when sanatoria show in their records on discharge only 25 per cent arrested minimal cases, and only 2 to 5 per cent of arrest in the moderately and advanced groups, one begins to wonder if this is good enough. It certainly would not be considered good enough in the treatment of many other diseases. Obviously it is necessary to diagnose more minimal and early cases and to treat them more actively to bring up the percentage of arrests out of the quiescent or unimproved class. Barnes and Barnes[14], studying 1,454 cavity cases, found a mortality rate of 80 per cent within 1 year and 90 per cent within 5 years. Sprungman[15] followed 626 cases of untreated cavities over a period of 16 years. He found a total mortality rate of 78.2 per cent and a death rate of 61.7 per cent for the first 2 years. Of the small surviving group, 69.1 per cent were totally or partially disabled and only 4.1 per cent of the whole number were working. Under collapse treatment by pneumothorax, of 86 labourers, 61.6 per cent had regained and retained their working

and earning ability after 1 to 5 years; only 21.1 per cent were incapacitated and 17.4 per cent had died. Northville Sanatorium, Michigan, had in 1927 a mortality rate of 25.8 per cent and only 8 per cent of all cases were discharged as arrested. In 1931, the mortality had dropped to 10 per cent and the arrested cases on discharge had reached 34 per cent. At the present time 77 per cent of all cases are under some form of collapse therapy[16,17].

Bachmeister,[18] speaking of the experiences in Swiss Sanatoria says—"Given a cavity the size of a cherry at the onset of sanatorium care, and unless that cavity has steadily shown a tendency to close, and does close, or has been closed by artificial means, only 20 per cent of chances exist that the patient will be alive in six years, even with continuous sanatorium care."

More and more, rightly or wrongly, and I believe, wrongly, we are regarding pulmonary tuberculosis as a disease of a lung instead of the entire body. It is truly a form of scientific despair which will seem absurd when immunology and serology come into their own. Yet, that narrow and empirical viewpoint of the mechanical mind, with its eyes fixed on practically nothing but the local pulmonary lesion, has contributed more to the successful treatment of this disease than a hundred years of forced feeding, fresh air, vaccine and chemicotherapy, change of work, or intermittent rest with exercise.

Who can regard the millions of money lost in earning capacity each year, the high cost of sanatorium upkeep, the poor results of short-time hospitalization, the drain on the patient's, his family's, or his country's purse, the years wasted in curing, and the lives lost, without thinking that sanatoria and short bed-rest are not worth while? The day of the sanatorium as a sort of boarding-house is past. The modern sanatorium is a hospital for active treatment. No sanatorium to-day can call itself modern which does not have at least 50 per cent of its patients under some form of collapse therapy, a distribution of say 30 per cent pneumothoraces, 15 per cent phrenicectomies, and 5 per cent thoracoplasties or extra-pleural wax fillings, etc. Compression saves time, saves money, and saves life. The patient with early tuberculosis who, through economic pressure, can afford to spend less than two to three years in a sanatorium must have mechanical pressure. Lack of time and money kills more cases of pulmonary tuberculosis than lack of resistance to that disease. The poor man dies because he cannot afford to live. Here the economist and the sociologist meet the compressionist on common ground.

### SOME SUGGESTIONS IN COLLAPSE THERAPY

1. *Bed-rest.*—The irreducible and minimal "time period" for complete bed rest for any type of pulmonary tuberculosis is six months. A few minimal lesions need only one time-period in bed; all moderately advanced lesions should have two periods in bed; and the far advanced up to three and four.

Bed-rest should mean *complete* bed-rest, a vegetative existence. The maximum non-mechanical immobilization of the lungs must be insisted upon, to utilize the short time at our disposal and not waste time on "limited" exercises. All patients should be put to bed immediately and placed under observation for a period of one week to one month before collapse therapy be instituted.

Postural bed-rest for unilateral cases, especially of the soft type, will sometimes bring most gratifying results. It is achieved by the Davis sling, shot bags, or by lying on one side, and must be persisted in for a long period of time.

2. *Clearing.*—Clearing should be very marked to encourage one in persisting in bed-rest without mechanical relaxation therapy. A clearing report, with ill defined, irregular areas of rarefaction and a positive sputum, must be accepted as cavitation, and demands compression of some sort.

3. *No change.*—Most lesions, except the fibrotic type, will swing one way or another. The unchanged, sluggish, mixed type needs surgical treatment.

4. *Increase.*—This shows poor general resistance, and no time is to be lost in compressing this type, or eventually cavity formation will take place.

5. *Temporary phrenicectomy.*—For bilateral disease, a temporary interruption only, that is, a crushing with excision of accessory phrenic branches may be done. This will give relaxation from three to six months, or even longer. No permanent phrenicectomy in bilateral disease should be done, as it may be needed urgently and later on the other side. If, of course, the other side is holding well, after the first appearance of movement of the diaphragm following crushing the temporary phrenicectomy may be made permanent, but even before this is done the question should arise whether or not to substitute a pneumothorax instead and keep the permanent

phrenicectomy in hand for the possible increase or spread on the other side, in the event that pneumothorax there might be unsuccessful. It might even be suggested that the careful surgeon should determine whether or not the other side has a free pleural space.

6. *Permanent phrenicectomy.*—This should be tried first for small early unilateral lesions of the soft or mixed type, with or without small cavitations. If cavities are present, they should be of the thin-wall or "moth-eaten" variety, irrespective of their geographical position in the lung, and these can be expected to close in about 50 per cent of the cases. The operation is not to be trusted to produce much benefit in fibrotic lesions with fixed wall cavities; occasionally it will make a pneumothorax unnecessary. Not infrequently, following a phrenicectomy, improvement will be observed for a couple of months, when no further progress is made. If the x-ray film shows these lesions not clearing after two months, or increasing after one month following phrenicectomy, then pneumothorax should be done. Regard the principle of all relaxation therapy as *purchasing collapse as cheaply as possible.* The ideal is simplicity and cheapness of procedure with a maximum of benefit. Phrenicectomy is the cheapest form of lung relaxation and, also, the least efficient; pneumothorax comes next and is by far the best; thoracoplasty is the most expensive but also irrevocable. It is also inadvisable to do a permanent phrenicectomy on the same side as an incomplete pneumothorax if the other lung is at all questionable, and also if it is not known definitely that a free space may be obtained on that side. Bilateral pneumothorax may become indicated there for a spread or a re-activation, and may be unsuccessful. A phrenicectomy is then the only procedure left to do. Massive, soft, tuberculous pneumonias should have the partial relaxation which a temporary phrenicectomy will give for a period of a month or longer before a pneumothorax is applied, to see how they will react to this moderate degree of relaxation. If well borne, then the establishment of a low-tension pneumothorax, with a small collapse, gradually increasing, taking several months to establish, is a good policy to follow.

7. *A phrenicectomy on one side and a pneumothorax on the other.*—If a choice is permitted, keep the phrenicectomy for the small thin-wall cavity, and the pneumothorax for the more extensive, softer and newer lesions. Older fibrotic lesions with stiff-wall cavities are far more likely to have adhesions preventing collapse by pneumothorax than the softer type, which have not had time to form massive adhesions. It is also a good rule to attack first the softer and newer lesions and later the older and more stabilized type, where most of the damage has already been done. If cavities have thick walls it is useless to do a phrenicectomy, as they will not collapse on account of the resistance surrounding them. This type of cavity should have a high pressure pneumothorax applied. In many cases it is a waste of time to try and control a lesion with a phrenicectomy that demands a pneumothorax. Such bilateral cases should have bilateral pneumothorax.

8. *Scaleniectomy.*—For upper apical lesions with cough and sputum, with or without small cavities surrounded by a fair amount of approximately good lung, scaleniectomy may be tried at the same time as a phrenicectomy, if pneumothorax is unsuccessful, or if extensive apical adhesions are holding open cavities in pneumothorax.

9. *Bilateral pneumothorax.*—This is best for not too densely infiltrated bilateral, mixed type lesions confined to both upper half lung fields. Keep the pressure low and equibalanced. Refill each side once or twice a week, alternately. Avoid accordion-like action of either lung. Content yourself with 50 per cent collapse on each side. Do not put either side down suddenly, but take a month or six weeks to establish your end.

10. *The time to keep pneumothorax maintained.*—This will depend on (*a*) the original pathological substratum; (*b*) the percentage of collapse obtained, and whether efficient or not; (*c*) the condition of the pleura, thickening, etc.; (*d*) the ease of obtaining refills; (*e*) complications arising, such as bilateral spread, fluid or spontaneous rupture.

We feel that many minimal, and some moderately advanced, lesions, with or without original small cavitations, which have had a technically efficient collapse, may be let out in three years. Cavities with originally thick walls and which took some time to compress should be kept down for five years. An 80 to 90 percent collapse for three years is better than a 30 to 50 per cent collapse with partially uncollapsed cavities for five years. Pleuræ which are thickening rapidly, either through fluid or otherwise, should be watched carefully and let out as soon as possible, say in three years, owing to danger of rupture if

left too long and then allowed to stand. We have seen spontaneous rupture of a lung which was allowed to expand after fifteen years' pneumothorax. These old standing pneumothoraces will frequently have pain on re-expansion in the attempts of the thoracic contents and the chest walls to compromise. They specially need the protection of a phrenicectomy before re-expansion is induced. If cavities are uncollapsed after one year of partial successful pneumothorax, and after high pressure has been applied unsuccessfully, they should have a thoracoplasty, if the other side will stand. In general terms, the more complete the collapse, the better the final result, but the pursuit of this ideal may be penalized by the rupture of cavities, fluid or pus formation, cardiac or mediastinal dislocation.

11. *Wax filling*—may be used for unilateral cavitations which, if the other lung were good enough, would demand thoracoplasty. It may be used also for bilateral apical cavitations in place of bilateral upper stage thoracoplasty. In upper thoracic localized compressions no phrenicectomy should ever be done.

12. *Thoracoplasty*—is a reasonably safe procedure (mortality in selected cases, 5 per cent) for unilateral cavitations of the predominatingly fibrotic type. The operative mortality is much reduced by previous pneumothorax of a year or longer. It is an operation on survivors. There are many varieties—the total two, three or four stage posterior, the supplementary early or late anterolateral, the unilateral and bilateral partial upper, the unilateral upper with pneumothorax on the same or the other side. Thoracoplasty is usually a sign of neglected or delayed treatment in the past and should be a rare procedure in the future!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## THE ROLE OF IODINE IN THE MANAGEMENT OF HYPERTHYROIDISM*


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IODINE in the form of Lugol's solution has been freely used within the last few years in the management of hyperthyroidism. A drug so valuable in the treatment of such a prevalent disease merits deep consideration. The chief purpose of this paper is to discuss the indication for the administration of iodine in the treatment of hyperthyroidism, in the hope that it will contribute to a more lucid understanding of the subject, particularly by those who rarely encounter this condition.

In 1895, Bauman showed that iodine was a normal constituent of the thyroid gland and since that date a great amount of experimental and clinical work has been done, dealing chiefly with the prevention and treatment of simple goitre in childhood and adolescence. Although occasionally one heard of its beneficial use in exophthalmic goitre, it was not until about nine years ago that iodine was really accepted as being of great value in treating hyperthyroidism. Plummer unquestionably deserves the credit for popularizing its use in this disease. Lugol's solution, consisting of iodine, potassium iodide and water, was used in hyperthyroidism of the exophthalmic goitre type with such success that some clinicians began to use it in all forms of hyperthyroidism and with this view I am in sympathy.

When a new agent is brought out for the treatment of some particular type of disease the profession very often overestimates its usefulness and applies it in too broad a fashion and poor results are sure to follow. The introduction of Lugol's solution for the treatment of hyperthyroidism has been no exception to this rule, chiefly because many physicians fail to remember that the early improvement from the use of iodine is very often not sustained and that the operative treatment should be carried out during

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the period of this early improvement in the patient's condition. If one fails to operate at this time the patient may relapse in the course of the next few weeks or later, and operation may have to be done at a much greater risk than is necessary. I have seen a few cases of exophthalmic goitre that had been treated with Lugol's solution with the usual early benefit, but as they continued taking the medicine they relapsed and went down rapidly, developing acute thyroid crises with persistent vomiting and diarrhœa from which they died. Each time I have seen such a case I have wondered why thyroidectomy was not carried out during the early improvement under iodine therapy when the risk would have been slight indeed. There are the others that have relapsed under iodine therapy, less unfortunate than the cases just stated, inasmuch as they are not classed in the hopeless group, but they undergo operation at a much greater risk than would have been the case had they been operated on eight to fourteen days after beginning the administration of iodine, at which time the maximum degree of improvement is usually noted. I would like to stress the importance of the foregoing facts and to state once more the necessity of considering iodine therapy in hyperthyroidism as a pre-operative measure and of withholding its use in such cases until the patient has been made acquainted with the situation and is prepared to have operation carried out when the period of maximum improvement has arrived after its administration. In reaching these conclusions I feel that I am on safe ground, recognizing, of course, that all cases of hyperthyroidism do not become aggravated on prolonged iodine treatment, but feeling that the incidence of aggravation of symptoms is so great as to make it a menace to this class of invalid.

The dosage of Lugol's solution as a preoperative agent may be given as from ten to twenty minims three times a day. The objectionable taste is easily disguised by diluting it in grape juice. If the patient is acutely ill and vomits persistently sodium iodide may be given intravenously. It is uncertain how well Lugol's solution is absorbed from the rectum.

In hyperthyroidism of long standing when cardiac decompensation exists it is often advisable to treat the heart condition by rest and digitalis for a time before administering Lugol's solution, lest the maximum benefit from the solution be obtained before cardiac compensation is well established. In preparing these cardiac cases for operation I never consider auricular fibrillation seriously. It is usually present in this type of case and very rarely disappears as the heart becomes compensated. I do not think that it adds anything to the danger of operation. In the large majority of cases the cardiac rhythm becomes normal a short time after thyroidectomy and in the few cases in which arythmia persists for more than three or four months following operation the use of quinidine should be considered. This drug almost invariably establishes normal rhythm but when the heart is greatly enlarged and the musculature has not been sufficiently active to entirely empty the heart with each ventricular contraction there is a danger of embolism, following the stimulating effect of quinidine.

The more acute the case, the greater is the improvement noted following the administration of Lugol's solution. The restlessness and purposeless movements decrease, a comparative degree of composure is established, the heart's action becomes much less tumultuous and its rate falls, sweating decreases, and with this improvement, of course, the basal metabolic rate decreases. Operation should be done at the optimum time, which is just as the patient is reaching the peak of improvement. I would sooner operate a little earlier when the patient is really on the upgrade than after he had been stationary for some time, possibly just at the beginning of a decline.

I have often been asked how sick toxic goitre patients must be before their condition is considered inoperable, and I have replied that the more ill they are the greater the need for surgery. One of the chief causes of death in long standing hyperthyroidism is congestive heart failure and so we find that some of the sickest patients we meet are those in the late stages of heart failure secondary to prolonged hyperthyroidism. This serious condition has been brought about by thyroid intoxication and the accompanying extra demand made upon the heart in the effort to meet the situation of increased metabolism and increased physical effort and movements. The heart musculature gradually becomes hypertrophied and in most cases auricular fibrillation develops and the well known clinical manifestations of congestive heart failure appear. The two things that would seem to be necessary to arrest the downward trend of such a case would be to decrease the load carried by the heart and to remove the toxic agent. Both of these indica-

tions are met by surgical treatment, the final result of which is often surprisingly good in the type of case just mentioned. This is why a thyroid case is never too sick for surgery. These cases never require emergency operations, but should be put under pre-operative treatment with a view to bringing about as great an improvement in their condition as possible before operation is undertaken. The type of operation should be chosen with a view to the condition of the patient. Occasionally multiple operations may appear safer, although producing the required result after a longer period of time.

Iodine has been of inestimable value as an aid in pre-operative care in hyperthyroidism and has contributed in no small measure to the lowering of the mortality rate in these operations, particularly among those who agree with me and accept all bad risk goitres for operation. Nearly two years ago I reported a mortality rate of 0.92 per cent for the last 844 consecutive thyroidectomies, and since then I have lost 2 cases in 530 consecutive thyroidectomies, which makes a mortality rate of 0.377 per cent. There are many factors, such as the period of operation, technique, etc., which contribute to the responsibility for this improvement, but I feel that no such low mortality in this class of patient can be obtained without the assistance of iodine medication.

The histological changes in the goitre of Graves' disease following iodine administration give us valuable information in seeking a reason for the clinical improvement in such a patient after the use of iodine. The thyroid becomes less vascular, the epithelium in the acini changes from the high columnar to a low flat type, much like the cells in a colloid goitre. The gland usually becomes a little larger and much firmer, due to the distention of the acini by colloid material.

The post-operative use of iodine is very important. As soon as thyroidectomy has been performed every effort should be made to keep the patient fairly well saturated with iodine. During the first twenty-four hours after operation the patient is often nauseated and may vomit periodically, and the stomach cannot be used for the administration of iodine. I always give iodine in normal saline by the bowel within an hour after operation, and if the patient is very sick I give from one to two grams of sodium iodide intravenously, once or twice during the first twenty-four hours. After this, the patient is usually able to take by mouth a sufficient quantity of the drug. If a fairly radical operation has been performed hyperthyroidism will disappear within a week, but iodine should be continued for at least some weeks after operation. The dose should be gradually diminished and as long as the patient remains well no further iodine is necessary.

Occasionally a patient will continue to feel well for some weeks or months after discontinuing iodine and then gradually develop some of the symptoms of hyperthyroidism, such as nervousness, restlessness, pounding of the heart with increased rate, loss of weight, and become very easily tired. If the basal metabolism is taken it will be elevated. These symptoms will soon disappear if the patient is promptly given Lugol's solution again for a time, but if this is withheld he will often gradually develop an increase of thyroid tissue, due to an hyperplasia of the thyroid tissue left at operation, and soon a well marked recurrent goitre is present, which might have been prevented had iodine been used as soon as the symptoms returned.

The apparent result following thyroidectomy is usually very good, but in patients who have had a severe form of Graves' disease we often find that for several years after operation their resistance to physical effort and sudden extra demands is limited. In such emergencies the administration of iodine will increase their tolerance. Not long ago I saw an elderly woman on whom I had operated about three years previously for a severe form of Graves' disease. She had fallen and sustained a fracture of the neck of one femur. Her physician became alarmed at the acute character of her reaction, as in a few days following the accident she became very restless and her pulse went up steadily to 150 per minute. She appeared very sick and was getting steadily worse. I suggested to her physician that I thought she needed iodine. He at once began the administration of Lugol's solution, and following this her pulse rate steadily dropped and in a few days it was normal, with a corresponding improvement in her general condition.

## CONCLUSIONS

In the treatment of hyperthyroidism Lugol's solution is a valuable agent if used (1) as a pre-operative measure, and (2) as a post-operative aid in assisting the re-establishment of normal thyroid function.

# THE TREATMENT OF MIGRAINE WITH EMMENIN*

## A PRELIMINARY REPORT

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WE are accustomed to regard as serious only those diseases which directly threaten life. But there are many other disorders which, while they do not usually prove fatal, are yet attended by so much distress, are so incapacitating, and are so resistant to treatment that they form very serious handicaps indeed to those whom they afflict. In this latter group occurs that common, little understood, and intractable condition called migraine. A host of remedies—mineral, vegetable and animal—have been employed in an effort to mitigate the violence of its agonizing pain, but ordinarily with such little success that, to the sufferer, the swallowing of medicine eventually becomes a rite from the performance of which benefit is hoped for rather than expected. It is our purpose in this paper to draw attention to still another remedy. In this instance, however, the remedy is one that appears to have a rational, physiological basis and is one that gives in its results a clinical proof that such may be the case.

There is no unanimity of opinion as to the cause of migraine. It is variously attributed to endogenous and exogenous toxins, to endocrine disturbances, especially of the thyroid and pituitary glands, to vasomotor spasm, to unilateral hydrocephalus and so on. It may well be that all of these theories are in part correct; that just as migraine is a form of headache, and headache itself may be the result of many causes, so migraine also may be a symptom common to several pathological states and may, under differing circumstances, manifest itself in a variety of ways.

In considering the etiology of migraine most authors pay remarkably little attention to the rôle played by the ovary in these cases. Yet in one type at least there are many features suggestive of ovarian dysfunction. In female patients (and most of the sufferers from migraine are females) the disorder often makes its first appearance about the time that the ovaries are beginning to become active. Again, the attacks cease during pregnancy and at the menopause. Further, many of the patients have associated menstrual irregularities and the paroxysms either occur during, or are most severe at, some definite phase of the menstrual cycle. These facts suggest that certain cases of migraine are intimately associated with abnormal ovarian function and suggest further that treatment directed toward the ovary might conceivably modify the incidence and severity of the attacks. Acting on this assumption a variety of ovarian preparations were tried without the patients deriving any appreciable benefit. It then occurred to one of us (N.H.B.) that emmenin, which contains the ovary-stimulating hormone of the placenta, might succeed in correcting the underlying pathological state which expressed itself in paroxysmal attacks of headache. In order to put this hypothesis to the test, a typical case of migraine was selected for the experiment. The following is a summary of this patient's history.

### CASE 1

A married Canadian woman of 38 years had had headaches for 23 years. The pain began over one eye and spread backwards over one side of the head. The attacks were frequent and severe, being almost unbearable when they occurred just prior to menstruation. The pain lasted for at least a day and was followed by nausea and vomiting. Menstruation began at 14 and the headaches shortly afterward. During her three pregnancies she was free from attacks. At times the pain was so severe that morphine was necessary to give her relief. She had had her eyes tested but glasses gave her no relief. She had submitted to curettage, appendectomy, and the removal of an ovarian cyst; she had also had her cervix amputated. These operations did not help her. Lately she has been gaining weight and now weighs 160 lbs. She was given emmenin, half a drachm twice daily from December 8th. On the 23rd she reported "Headaches occasionally but not so severe". The dose of emmenin was increased to a drachm twice daily. On January 13th, she said that she was free from headaches. The dose was left unchanged. On February 16th she expressed herself as feeling "awfully well". There had been no headaches for six weeks. The dose was reduced to half a drachm twice daily, where it still remains.

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The results obtained in this case encouraged the use of emmenin in other patients and altogether 20 women suffering from migraine have since then been treated in this way. The following are brief histories of some of these cases.

CASE 2

A married Canadian woman of 35 years had had headaches all her life. They began in childhood but she is not sure at what age. The pain was very severe and lasted two or three days, when it ended with vomiting. She always suffered most before a period was due. She had no attacks during her pregnancies. Of late she had been gaining weight. She had taken thyroid extract and ovarian substance but relied chiefly on "222", which she consumed in large amounts. On February 5th she was given emmenin, one drachm twice daily. On 22nd she reported occasional slight pain, but no nausea. On March 28th she reported complete freedom from pain and a loss of 8 lbs. in weight. The dose was reduced to half a drachm twice daily. On April 25th she said that she was feeling better than she had done for years and had lost an additional four pounds.

CASE 3

A married Canadian woman of 34 years complained of right-sided headaches which had been very severe for the past year (since her child was born). The pain was most severe before menstruation. On December 15th she was given emmenin, half a drachm twice daily. In five days she reported that the headaches had disappeared. The emmenin is now taken at intervals. There has been no return of the headaches.

CASE 4

A married Canadian woman of 40 years had had headaches for 20 years. They affected one side of her head and were agonisingly severe. Usually the pain began over one eye and spread over one lateral half of the head. The attacks lasted several days and she had to take to bed. The bout ended with vomiting. She had complete freedom during her pregnancies. Operative and other procedures had not mitigated the severity of her attacks. She had gained weight during the past three years. She was given half a drachm of emmenin twice daily, and a month later reported that she had been free from pain for the previous fortnight. She had had no other attacks.

The other histories are very similar to those just given. In age the patients ranged from 20 to 40. The attacks varied from one or two each month to several each week. The duration was from one day to several days. The pain was usually described as severe and sometimes as intensely agonizing. In every case the premenstrual attacks were the worst. Those who had borne children experienced no attacks during gestation. Some of the patients had amenorrhœa, several had dysmenorrhœa, many were obese. A mother and her daughter, an aunt and her niece, were among those treated. All of them had taken a variety of remedies. Two required occasional doses of morphine. One took from 8 to 10 "222" tablets daily. One estimated that she took about 100 "222" tablets each month. All had had their eyes tested. The results of surgical "interference" proved the correctness of that word.

No other medication was given while the patients were getting emmenin. The initial dose was half a drachm twice daily during the intermenstrual period. Occasionally this was increased to a drachm twice daily and in one case to a drachm three times daily. Ordinarily the headaches disappeared within ten days or two weeks. The dose was then reduced or the intervals lengthened. Several of the patients declined to tempt Providence and refused to decrease the dose beyond the half drachm twice daily. In one case the emmenin was discontinued after two months' treatment, but after a month the headaches threatened to recur and the patient returned to the small daily doses.

But the relief from pain, while it was the greatest, was not the only benefit that the patients derived from emmenin. Those who suffered from menstrual irregularities and discomforts found these greatly inproved. The obese were delighted to find their excess weight leaving them, and all experienced a sense of well-being to which many of them had long been strangers.

The results obtained in this series of cases have naturally aroused our interest, but many points yet remain to be settled. So far the patients treated have all been of one type and it is to this type alone that our results apply. We do not suggest or believe that emmenin is a specific for all types of migraine or all sorts of headaches. So far we have not determined the ideal dosage, either as to amount or intervals. We do not know what the minimum dose may be nor what the number of such doses may be, nor at what time in the menstrual cycle such from attacks. The cases reported have not been under observation long enough for one to know whether or not emmenin can effect a permanent cure. These are matters which we mean to investigate fully. Our present purpose is merely to draw attention to the results that have followed the administration of emmenin to a group of patients, all of them victims of a most harassing and distressing affliction, an affliction equally harassing and distressing to patient and physician alike.

SUMMARY

1. Certain cases of migraine appear to be due to ovarian dysfunction.

2. In these cases emmenin, the ovary-stimulating hormone of the placenta, gives relief to the point of complete freedom from attacks.

3. A series of 20 cases of migraine treated with emmenin is reported.

4. In addition to relief from pain the patients experienced

(*a*) improvement of menstrual disorders;
(*b*) loss of excessive weight;
(*c*) a sense of well-being.

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## THE MANAGEMENT OF POSTURE IN CHILDREN

By Reginald H. Wiggins, M.D., C.M.,
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POSTURE, or body mechanics, has been defined by the sub-committee of the recent White House Conference on child hygiene as "The mechanical correlation of the various systems of the body with special reference to the skeletal, muscular, neurological and visceral systems." Normal body mechanics obtains when this mechanical correlation is most favourable to the function of these systems.

The subject of posture has largely been taken up by orthopædists. Possibly this accounts for the fact that little stress has been laid on the prevention of bad posture. They have dealt with the correction of deformities resulting from faulty posture, but prevention is the duty of the general practitioner and pædiatrist or any who have committed to them the well-being of the hope of the race, the child. Some, deprecating the extreme importance of the subject, have said that we do not want our children walking around as if they had a poker laced to their backs. True we do not, but we do want to see our children sitting and standing erect and not slumped over, and when walking to have a free, easy, erect carriage, rather than the cramped, restricted and slovenly carriage of the incorrectly postured child, with its untoward cumulative effects resulting in physical and mental inferiority.

Some figures, adequately demonstrating how prevalent faulty posture is among young people, have recently come to us from Osgood, of Harvard. We will remember that posture is graded into A. B. C and D, representing excellent, good, poor and bad.* A summary of the results of these surveys showed that eighty per cent of the young men entering Harvard University and the same number of the girls entering Smith College were found to be the subjects of faulty posture, and had had to be graded "C" and "D". A similar number had to be classed in the two lower grades as the result of a survey of two thousand children in the Chelsea, Mass., schools, who ranged in age from five to eighteen years. The author is able to report approximately similar findings in the examination of 4,000 children throughout the State of Maryland in the years 1926-27. The greater number of these were pre-school children from rural communities. All of which proves to us that faulty posture, even that of severe grade, is much more prevalent than casual observation would lead us to believe.

To come to the purpose of this article, treatment, we will divide the subject as before, into preventive measures and active correction, and will list the headings under each, the better to emphasize them. Some items apply to both preventive measures and correction of the already developed deformities.

### Preventive Measures

In this discussion it is assumed that the children will be given proper nourishment and allowed adequate rest and normal activity.

*Measures.*—(1) Inculcation of "posture mindedness;" (2) afternoon rest periods; (3) the child to be for the greater part of the time on its abdomen; (4) adequate support when being lifted and carried; (5) proper springs and mattresses; (6) sufficient vitamines; (7) clothing adequate for warmth but not restricting free movement; (8) development not to be forced, particularly in the presence of rickets, debilitating conditions, or after acute illness; (9) avoidance of sedentary habits and prolonged sitting positions.

1. Inculcate in the child 'posture mindedness' and stimulate his pride in his physical fitness. The child's pride can be justly appealed to, and usually with gratifying results. However, we must remember the cardinal rule that all instruc-

* See *Canad. M. Ass. J.*, 1931, **24**: 820.

tion and advice given to children must be generously diluted with sympathy and patience.

2. Afternoon rest-periods are most essential in any preventive measures, as it is when the child is tired or exhausted that the muscular supporting structure is weakened, thus leading to the assumption of incorrect attitudes which have a tendency to increase and persist. These rest-periods help to lessen the great numbers of tired children who are misunderstood and misjudged. They should be enforced for a period of from one to three hours for all children up to school age, and this rule admits of few exceptions. Even if the child may not always sleep, he will gain the benefit of a rest from his perpetual play activity.

3. We are indebted to Merrill, of Philadelphia, for this rule—that the infant, after one month of age, unless in a definitely weakened state, should lie for the greater part of the time on his abdomen, particularly during his waking hours. Then the back, abdominal, and buttock muscles, those most important in maintaining correct posture, will be continually exercised. When the infant lies on his back all muscles are relaxed. This measure is particularly valuable in preventing the development of round shoulders and round back.

4. Great care must be taken lifting or carrying infants; proper support must be given. Their weak and tiny frames when called upon to support their own weight are not capable of the task and their supporting structure suffers, leading to the beginning of a faulty attitude.

5. The mattress and springs of the bed require attention. The mattress should be fairly firm, the springs taut and of good quality; both must allow no sag in the centre. The mattress should be turned and reversed and beaten out frequently so that depressions will not develop. The pillow, even a flat one, is better omitted. It is not necessary and the child brought up without it will not miss its comfort.

6. Cod liver oil and orange juice should be begun at one month and given in larger doses than is the custom. It would seem necessary to point out that there is no standard dose for every child, as some require more than others.

7. Too many clothes not only restrict a child's free and natural movement and thus hamper his proper development but prevent fresh air from reaching the skin, favouring the production of poor muscular tone, the most prolific cause of bad body mechanics. It is important to have the straps to which the suspenders are attached near the neck on each side and not out on the shoulders.

8. The forcing of the child's development requiring him to sit, stand, and walk, before he is physically able to do so, must be guarded against in the presence of rickets or any debilitating condition. Both of these must first be overcome as far as possible. After acute illness sufficient time must be allowed for the child to regain his former muscular tone.

9. Avoidance of sedentary habits and prolonged sitting positions. Particularly when the child is reading must we see that he assumes a somewhat correct position and is not slouched over or curled up, as is so often the case. Positions assumed by children at their desks in school must be supervised.

We must have our eyes open for manifestations of bad posture when the child comes before us. If we do not have the opportunity of seeing the child we should advise the parents to strip him, view him from front, side and back and look for postural defects.

### ACTIVE CORRECTION

This aspect of the subject will be taken up under the following headings:

1. *General measures.*—Before any abnormal condition is attributed to incorrect body carriage, a thorough examination of the child must be carried out and due regard given to the correction of any defective environmental influences, including the attitude and temperament of those who care for the child, also attention to the diet and any faulty eating and sleeping habits and details of personal hygiene. We must enlist the interest and co-operation of both parents and child by stressing the importance of correct posture and its relation to health and the continued lack of efficiency and energy resultant upon poor posture.

2. *Rest periods in prescribed positions.*—These rest periods are greatly responsible for the gains in weight which these children, if properly treated, usually manifest. They should be enforced for a period of at least thirty minutes daily. Two examples will be given. Others may be devised by the physician as the occasion demands. (*a*) With flat chest, drooping shoulders and round back, have the child lie on his back on a small firm pillow extending from the shoulders to the lower border of the ribs and rest in this position for half an hour. (*b*) In the event of lumbar lordosis being present, and

if retro-peritoneal fat is lacking, have the child lie prone on a firm pillow extending from the shoulders to the hips and rest in this position for the usual period of at least half an hour. This position tends to correct the lordosis and the abdominal organs fall away from the spine, giving nature an opportunity to rebuild the fat. The fat plays an important part. People with poor posture often improve it when they grow corpulent, though their muscles soften. This is an exception to the rule that good body posture is dependent upon well toned musculature.

3. *Prescribed exercises.*—Through this measure we tend to improve not only the functions of the respiratory, circulatory and nervous systems but the metabolism and the supporting structures and hence benefit the posture. Naturally, building up of the entire body musculature is of importance in the correction of faulty posture, but in this certain muscle groups are more important than others. Broadly speaking, the following are of the greatest importance in maintaining good posture; the abdominal, thoracic, spinal and gluteal groups.

The exercises which follow are designed particularly to build up these muscle groups. The carrying out of these daily may require considerable persistence and may become arduous, but as a profitable investment it ranks supreme, particularly when we appreciate the improvement in body posture, the reduction of fatigue and increase in efficiency which are the results. The key note in any postural exercises is relaxation. A body which is in a relaxed state mentally and physically more readily responds to the training of new motor co-ordination. These exercises will vary according to the individual needs and the age of the child. As space does not permit detail of all the suitable exercises a general summary only can be given which is suitable for most conditions and for the average child. They are grouped according to position in which they are taken.

*Lying on the back:*

(*a*) *Abdominal retraction.*—On the count of "one" have the child retract the abdomen and tip the pelvis upward. Hold for a few seconds, then relax and repeat ten times.

(*b*) *Hip flexion.*—Arms under head; keeping feet together; flex knees, then thigh on abdomen; on the count of "one" slowly extend on "two". Repeat ten times.

(*c*) *Arm circumduction.*—This is combined with deep breathing. With the arms to the side raise up and back until they touch the floor, inhaling the while. Return them to the original position, slowly exhaling. Repeat ten times.

(*d*) *Leg flexion.*—Keeping the abdomen retracted and the pelvis tilted upward, with the feet together and the hands under the head. Slowly raise the legs alternately five times to a right angle with the body and slowly lower. Repeat an equal number of times with both legs.

*Lying prone:—*

(*a*) With the feet held down, a pillow under the abdomen, the hands behind the head, and the feet together, slowly raise the head and shoulders as far as possible and slowly lower. Repeat ten times. Do not attempt this unless the feet are held by an attendant or braced under a support.

(*b*) *Back abdominal.*—A similar exercise, only performed lying over the edge of a table or bed, with the edge of the table or bed at the pelvis. The feet should be together and firmly held to the table by an attendant, with the hands behind the head and the abdomen retracted, and the head held on a line with the body. Mainly by the aid of the back and abdominal muscles we pull the body upwards so that it is on line with the table, holding the back and neck firm. Hold thus for a few seconds, then slowly lower to original position. Repeat, gradually working up to five or six times.

*Standing:—*

Stand erect with toes turned slightly in and the feet about six inches apart.

(*a*) With the pelvis tilted upward, the abdomen slightly retracted, and holding the knees straight, bend the body forward until the hands touch the floor. Hold for a few seconds and return to the standing position. Repeat ten times. A similar exercise may be done with the hands behind the head, bending down at the pelvis, keeping the spine rigid and straight, holding and returning to the original position.

(*b*) *Abdominal retraction.*—With the back and heels against the wall, the arms to side and the palms forward. Retract the abdominal muscles and tilt the pelvis upward so that the hollow of the back entirely disappears. Repeat ten times.

(*c*) *Body stretching.*—With hands on hips and the head held up. Stretch the body up as far as possible, (stretch "tall" as it were). Relax and repeat ten times.

(*d*) *Balancing.*—With the heels together, the

toes turned slightly out, the pelvis tilted upward, the abdomen retracted and the hands behind the head, rise on the toes, bend the knees until the buttocks rest on the heels, keeping the original position of trunk unchanged. Return to the standing position and slowly lower the heels. Repeat five times.

(*e*) *Trunk stretching.*—Stand on the toes, one foot advanced in front of the other, the pelvis tilted upward, the abdomen retracted, and holding a wand with both hands high over the head. Keeping the body stretched as much as possible, stretch the wand as high as possible, and walk slowly on the tips of the toes. Take three or four dozen steps in this position.

(*f*) *Body bending and twisting.*—With the feet wide apart, the hands high over the head and separated by the width of the head, twist and bend the body, touching the hands to the floor, first to one side then to the other, keeping the arms stretched in line with the head and over the centre of gravity of the body. Repeat ten times.

*Walking:—*

Walking, maintaining a correct carriage, with a book on the head for a short period at a time. This exercise has been suggested by observing some European and Asiatic peasant women who carry farm produce and other loads in baskets placed on their heads. These women almost invariably present an excellent posture.

*Feet exercises:—*

Abnormalities of the feet are often not only painful and incapacitating but are a large factor in the production and maintenance of faulty posture. Hence corrective exercises for the feet are important. There are many causes, but they are in large measure due to lack of muscle tone and balance. The following exercises, briefly described, are designed to strengthen the various muscle groups whose function it is to give support and elasticity to the feet.

(*a*) *Flexion and extension.*—Sitting with the legs crossed, alternately fully extend and flex the foot at the ankle. Repeat twenty times.

(*b*) *Foot Adduction.*—Standing with the feet parallel and about four inches apart, the hands on the hips and the head up. Keep the toes on the floor slightly bent, and roll the knees outward. Return to the original position and repeat ten times.

(*c*) *Toes spreading.*—Sit down and rest the heels on the floor. Extend and spread the toes, then flex into the original position. Repeat twenty times.

(*d*) *Heel stretching.*—Sitting with the feet flat on the floor, flex the toes and pull the foot upward and inward as far as possible. Return and repeat with each foot twenty times.

*Play, games and walking:—*

All play and games, particularly in the open air, are productive of good muscle tone. Furthermore they tend to tone up the whole system. Play and games, however, should not be carried on to the point of exhaustion. Walking in the fresh air, maintaining an upright carriage and deep breathing for a short period (four to six respirations per minute), at occasional intervals, help very materially. Swimming is possibly the exercise from which the most benefit will be derived. It corrects faulty posture more naturally than any other pastime or sport. Many games have been devised which have their specific action in helping both to prevent and correct faulty carriage, but space does not permit an account of them.

*Mechanical supports, etc:—*

In correcting deformity braces should not be used unless absolutely necessary. For moderate cases of knock-knee, or bow-legs with pronation of the feet, we may wedge the inner margin of the shoe three-sixteenths of an inch and add a hard felt arch support to change the weight-bearing line. Many orthopædists use a light back-abdominal support for round shoulders, lordosis, and prominent abdomen. The disadvantages are that it is expensive and is apt to be cumbersome, despite the fact that the child does not complain; and we do not think it accomplishes what corrective exercises and other measures will. In principle such braces are not correct.

*Physical therapy:—*

We depend largely upon exercise for the correction of postural defects. This correction is based upon the building up of the tone of the muscles and ligaments and improving skeletal and joint relations. Physical therapy, provided it is judiciously and correctly applied, has an important place. The agents employed are:—

*Massage.*—By this is meant the scientific application of definite movements by a trained individual, not haphazard, ill purposed kneading by those not versed in the art. Massage, correctly given, stimulates the nerve endings, increases muscle tone, improves the blood and

lymph circulation and has a stimulating effect upon the general nutrition. It has an effect similar to that of exercise but to a less degree.

*Heat.*—Heat may be used in the form of hot applications, dry or radiant heat, or diathermy. The immediate results of its local application are relaxation of muscles, analgesia, relief of spasm, vasodilatation and local and general sweating. Heat is the most easily available form of physical therapy. Its greatest value in correcting faulty posture is in its relaxation of the muscles, because, as previously stated, a relaxed muscle more easily responds to new motor co-ordination. Diathermy has a limited application in a few selected cases, and it is not appreciably more effectual than other forms which are far less complicated and require less technique for application.

*Light therapy.*—Under this heading we include heliotherapy, or sunlight, and actinotherapy or ultra-violet ray. We have not reached the sublime stage of knowing all in the matter of light therapy, but under a proper technique and special training the results are usually beneficial. Sunlight, to be effective, requires the exposure of the entire body to the direct rays of the sun. The exposure is to be gradual and if properly carried out the skin is benefited and the general resistance built up, thereby indirectly improving the posture.

Ultra-violet ray therapy also helps to build up the general resistance, but to be of the most benefit in definite conditions, such as tuberculosis and rickets, knowledge is requisite and attention must be paid to the wave lengths used. The indiscriminate employment of the ultra-violet ray is to be deplored.

## CONCLUSIONS

Any comparatively new subject is not easily accepted by our profession, but we are convinced that correct posture in children is one of the most important and vital factors in child welfare. Incorrect posture ranks with nervousness, fatigue, and malnutrition, and with these, forms the big quartette of conditions chiefly responsible for the present lack of progress being made in the proper physical and mental development, well being and efficiency of the child.

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# SODIUM AMYTAL AND ITS USE IN THE TREATMENT OF ECLAMPTIC CONVULSIONS*

BY G. LESLIE WATT, M.B.

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IT is some thirty years since Fischer and Von Mering[1] brought out diethyl barbituric acid, or veronal, the first of the barbiturates. In that time there have been numerous derivatives of the barbituric acid group which have been used by the medical profession as hypnotics, probably the best known one at present being phenobarbital or luminal. It was not until 1923 that Shonle and Moment[2] reported the discovery of iso-amylethyl barbituric acid, or amytal. They discovered that this drug was a powerful hypnotic and could be used to produce surgical anæsthesia in animals. Considerable investigation was done along this line. In 1926 Page and Coryllos[3] isolated the sodium salt of this acid, which was used extensively from then on as an anæsthetic agent in experimental animals. In 1928 McCollum[4] and his co-workers were the first to induce anæsthesia in man by the intravenous administration of this drug. Following their report the drug was given widespread clinical tests throughout the country and valuable data obtained. These men also noted the effect of the drug in controlling convulsions of the various types and were especially interested in its action on the convulsions caused by cocaine poisoning. From 1929 on the drug has alternately found favour and disfavour as a general anæsthetic, but with this we are not particularly concerned in this paper. The first series of cases of eclamptic convulsions treated with it was published in 1929 by Robbins and will be referred to later.

Before discussing its use in eclampsia a brief summary of the pharmacology is necessary. As

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far as can be ascertained its hypnotic and sedative effect is due to its action on the thalamic centres. This was pointed out by Lundy[5] in 1929, but whether it was due to a stimulation or a depression of the centres he was unable to tell. The drug has a transient effect on the respiratory centre, the respirations becoming rapid and shallow. At the same time there is an initial fall in blood pressure and increase in pulse rate. These effects, however, are fleeting, and usually within the first ten minutes both the blood pressure and respirations have returned to normal, the pulse remaining slightly higher. Zerfas and McCollum found the urine negative following its administration, except for excessive urates for twenty-four hours. There was a slight drop in non-protein nitrogen for two days, but within normal limits. The carbon dioxide combining power was unchanged during anæsthesia and the blood sugar was found to rise slightly, but rarely exceeded the maximum normal limits. The metabolism remains normal, less than 5 per cent below basal metabolic rate, unless very deep anæsthesia is produced. The method of elimination of amytal from the body is of considerable interest to us and elaborate experiments have been carried out to ascertain what happens to it. Investigators have been unable to find amytal in the urine after intravenous injections of 22 gr. of sodium salt. They have also been unable to detect any of its three probable decomposition products. Evidently, then, amytal is rapidly and completely destroyed in the body, no trace of it appearing even in the first twelve hour specimen. Rankin, Drabkin and Bothe[6] conducted a series of autopsies on animals following repeated injections of sodium amytal, and concluded that in the amounts used it had no effect on the various viscera, which may be affected by other anæsthetic agents as determined by microscopic examination.

From this summary of the pharmacology it appears that the drug is a powerful sedative and hypnotic, which in ordinary doses does not affect the metabolism, shows no injurious effect on the kidney, is quickly destroyed in the body, and produces no ill effects on the viscera as shown under the microscope—surely an ideal agent to tide one over the dangerous convulsive period in eclampsia.

While a great deal has been written on the use of sodium amytal as an anæsthetic and analgesic, both for use in surgery and obstetrics, the literature contains very little with regard to its use in eclampsia. Only one other series of its use in cases of eclamptic convulsions has been published and that contained in a most comprehensive article by Robbins[7] *et al.* in a general summary of its use in obstetrics. He reports a series of 8 cases of eclampsia in which he was able to control convulsions immediately with doses varying from 7½ to 48½ gr. over a period of 12 hours. He supplemented his intravenous injection with intramuscular injections and in each of his cases no further convulsions ensued. He had two deaths in his series; one which he puts down to cardiac collapse on the second day following Cæsarean section, and the other occurring within three hours of the amytal injection, but the patient here showed at autopsy a beginning pneumonia which undoubtedly added to her toxæmia. He felt that in neither case did the sodium amytal have any bearing on the outcome.

John H. Moore[8] reports 3 cases of nephritis complicated by pregnancy, which showed the usual alarming symptoms of impending convulsions, and were treated by sodium amytal by mouth in order to insert bougies. The patients were kept under the influence of amytal until delivered and none developed convulsions; all progressed satisfactorily. He also had one case of eclamptic convulsions which he treated with sodium amytal with an excellent result.

In the Department of Obstetrics at the University of Toronto sodium amytal has been used in the treatment of patients with eclampsia. Although the series is not large, the results have been rather striking. The routine treatment of a case of eclampsia has been followed out as usual. The stomach is washed out, the colon irrigated, the patient purged with magnesium sulphate, and, when indicated, a bag is introduced to start labour. Amytal is of use only in controlling convulsions. At first, only oral administration was used and three cases were treated in this way. In one who received 9 gr. and later 6 gr. a good result was obtained. The patient went to sleep and no further convulsions ensued. In the second case the convulsions were not controlled and the patient seemed to derive little beneft from the amytal, though progressing favourably and eventually recovering. The third case is one in which the result was less fortunate. A patient was admitted with massive œdema, high blood pressure and albuminuria of three weeks' duration. She showed some decrease in œdema the first twenty-four hours in hospital, but the second day went into labour which was

prolonged due to a persistent occiput posterior position. The child had to be rotated manually and was delivered by forceps. She did not develop convulsions, but during her labour was given 9 gr. of amytal by mouth and later 6 gr. with a view to giving her relief from pain. Immediately after her delivery she developed anuria, became comatose, and died of uræmia. Here the amytal masked the beginning coma and there will always be some doubt as to how much it was to blame. The feeling was that it played no part in the uræmia. It should not have been used in this type of case, as the patient was perfectly quiet and had had no suggestion of a convulsion. Another sedative, such as heroin, would have been much better.

Following these cases it was felt that the intravenous method of administration should be tried, and it was done on 7 cases with marked success. In 6 out of the 7 no further convulsions occurred, though in each case the injection was repeated at the onset of restlessness. This as a rule became evident from two to five hours after the first dose. Sodium amytal for intravenous use is supplied in sealed glass vials accompanied by a vial of triple distilled water sufficient to make a 10 per cent solution of the proper pH for injection into the blood stream. The solution should be absolutely clear and if the least bit opalescent or cloudy should be discarded. Great care should be taken to inject it slowly, not more than 1 c.c. of the solution per minute. This should be actually timed and not done by guesswork, as the rapidity of injection has been shown to add greatly to its toxicity. The dose in man is variable and depends on the judgment of the administrator to a certain extent. The drug should be given until a satisfactory result is obtained, and this is the great advantage of the intravenous method, as the effect is immediate and can be observed during the administration, which allows absolute control. In eclampsia the dose is somewhat harder to judge, as the patient is usually more or less comatose, but it should be given till the patient becomes quiet and relaxed, twitchings disappear, and the respirations become more like those of normal deep sleep. There has been no difficulty in giving an initial dose of 7½ to 9 gr., which so far is all that has been necessary. It was noted that when about 3 to 5 gr. had been injected the patient's breathing became less stertorous and more like a deep sleep after the first rapid shallow breathing had passed. The colour improved. There was an initial fall in blood pressure and a slight increase in the heart rate, neither of which was long maintained. The pulse however did remain somewhat increased, between 90 and 100. Any twitching ceased and the patient's condition seemed more satisfactory.

In no case where labour was in progress was it thought that it was impeded and in some there was a distinct impression that the first stage was shortened. As a rule from two to five hours later the patients became somewhat restless and more sodium amytal was administered. The second dose was about 6 gr. as a rule. In all but one case this was sufficient to carry the patient through to delivery. In cases which are not in labour to begin with, or where the labour is prolonged, it is permissible to repeat the drug as often as necessary, one of Robbin's cases receiving as much as 48½ gr. in 12 hours, not all, however, intravenously. Time will be gained however by the administration of ¼ gr. of morphine at the beginning of restlessness, as usually this will hold the patient for another couple of hours, when a further injection of amytal may become necessary. In several of our cases a bag was introduced without any additional anæsthetic, but in most cases for operative procedures and during the second stage it is advisable to use gas and oxygen with the pains and it will be found that very little is necessary to control them.

Four of our case records show nothing very remarkable and it is not necessary to discuss them, other than to say that they had anywhere from 2 to 8 convulsions before being given amytal and none following its administration. They were delivered and made uneventful recoveries. Three of the cases bring out special points and require more careful study.

CASE 1.

Is one which had a three weeks' history of high blood pressure, œdema and albuminuria, and suddenly went into coma from which she would arouse at intervals in a maniacal state which was absolutely uncontrollable. She was given ½ gr. of morphine and an hour later 9 gr. of sodium amytal, when she immediately became quiet. A bag was inserted without further anæsthetic. She remained quiet for nine hours when she again became hard to manage and 6 gr. of amytal was given. Four hours later she was delivered of a living child. Subsequently she developed pneumonia from which she recovered and was discharged well six weeks after admission.

This case is one showing the efficacy of amytal in a case of the maniacal type of eclampsia without convulsions, which is just as serious and as difficult to treat as the usual convulsive type.

CASE 2.

Is one which developed convulsions while under observation in the ward. She was given three doses of morphine, gr. ¼, and her respirations came down to 12 per minute, in spite of which she continued to have frequent convulsions. She was given 9 gr. sodium amytal and became quiet; three hours later a bag was put in under light gas and oxygen anæsthesia, following which 6 gr. were administered. Six hours later a manual rotation and forceps delivery of a right occiput posterior was done under gas and oxygen. She had no more convulsions and she and the baby were discharged sixteen days after admission.

Here the patient received enough morphia to reduce her respirations to twelve per minute without any noticeable effect on the frequency of her convulsions, which were immediately brought under control by amytal.

CASE 3.

Is one with a definite history of convulsions, where labour lasted over a period of three days. The patient was admitted on January 5 of this year and was given 5 gr. on admission. This controlled the convulsions and on the following day a bag was inserted. Early in the morning of January 7 she went into labour and developed another convulsion. Five gr. of amytal were administered and she became quiet for five hours, when another convulsion occurred, and she was again given 5 gr. of amytal. From this time on she showed definite improvement with no further convulsions, although she was not delivered till 12.30 p.m. on January 9. She had a retained placenta which was removed manually and she has been running a low grade fever since. She is otherwise well, but has not yet left hospital.

This is cited to illustrate a long case where amytal was repeated at long intervals as the necessity arose.

It has already been stated that the series is very small and one should always be guarded in drawing conclusions from too few cases. However the results have been uniformly good, and one is justified in stating that sodium amytal will control the convulsions of eclampsia. From the investigation so far it may be concluded that it is non-toxic in its effect on the liver and kidneys, which is of especial interest in eclampsia. The results have shown that it is best given intravenously though a great deal of care must be exercised in its administration. As it is of value only in the control of convulsions or extreme restlessness bordering on mania, it should only be used in cases which have definitely shown the above symptoms and should not be used as a prophylactic as it may mask a developing coma.

In conclusion, then, one may safely state that sodium amytal is a very valuable addition to our armamentarium in the treatment of eclampsia.

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## IF STATE HEALTH INSURANCE COMES*

BY E. S. MOORHEAD, M.B.,

*Winnipeg*

A REVIEW of the British Empire, or of the white nations of the world, is bound to impress us with the fact that Canada, or more correctly Canadians, will demand that the experiment of health insurance be tried out at home. Other countries, other peoples have found that it helps to solve some of their difficulties; if theirs, why not ours?

It is not my intention to enter into questions of cost, or of the numbers that would be drawn into any system. That must be settled by actuaries. I shall simply take up one phase of the question. What is the medical profession able to give? What services does the public require? Seeing that free choice of doctors is a *sine qua non*, there can be no question, in so far as industrial workers are concerned, of whole time appointments. Since the practitioner will not be a civil servant, a pension scheme can only be secured by voluntary deductions amongst the doctors engaged in the work. The scale of pay must be arrived at by agreement. It will be based on broad economic lines, similar to the salaries or rewards in any other profession. It is quite likely that there will not be as great a divergence in pay between specialists and general practitioners as is found at the present time in private practice. Why should there be so wide a margin? Several years ago a specialist brought to bear on a problem two factors—a

* The author of this article is Chairman of the Welfare Supervision Board of Manitoba, Physician to the Winnipeg General Hospital, and has made a special study of health insurance schemes.

wide general experience, and marked skill in a particular field. He acquired his experience by earning his living as a general practitioner. He became interested in a special phase of his work. He studied, read, sought out and treated the type of case in which he was absorbed. He then took a post-graduate course, and, other things being equal, became a very valuable member of his profession. Your modern specialist brings from the beginning a high degree of skill, but his experience comes only after many years, and is not comprehensive.

Let us suppose that A and B graduate at the same time. A takes a post-graduate course in some special subject; B engages in general practice in a community where his talents are tested to the limit. At the end of two years A has acquired a marked degree of skill in one subject; B has a varied experience in many subjects, and, if he is observant, a deep and valuable insight into human character. Is there any reason why A's services to the community should be valued at from two to five times those of B? The lure of the high fees has drawn so many of the younger men into specialism that two evils have arisen. Fees have to be so high that a little work will provide for many rainy days. In the second place, the specialist finds himself compelled for financial reasons to treat a great many diseases other than those for which he was specially trained. In most cases they could probably be treated much better by the general practitioner.

If and when a scheme of health insurance is developed in Canada, the basic pay will be founded on the service that a general practitioner can give. Where specialists and consultants are required, they will of course be paid on a higher scale than will the general practitioner, but they will not differ as much from the basic scale as do the fees at present asked for in the two types of practice. The reason why this is so can be laid at the door of the specialist. He probably did not reason what the logical result of his actions during the last quarter of a century would be. Originally his services were a luxury available only to the rich or the very poor. Now they have become a necessity for everybody. The state will never allow a condition of affairs to arise where the services of certain groups of medical men are so high in cost as to be likely to wreck any scheme of social medicine that might be proposed.

I said that free choice of doctors was necessary. I will modify that statement by suggesting that such a regulation applies only to the family doctor. He is the friend, confidant and adviser. He must be *persona grata* in the home. At the present time should some emergency arise beyond his skill, he is frequently called upon to recommend the specialist. One may conclude that insured people are not likely to insist on free choice of a specialist. It can then be easily seen that the specialists will have to conform as regards services and fees to the economic possibilities of the proposed service, or submit to the alternative of whole time specialists on an inclusive salary. The same will apply to a consultant service. In fact it is very likely that one or more consulting referees will be needed in any industrial community. The medical profession always desires to dissociate itself from any question of sick benefits. The state wisely recognizes that supplying medical and surgical care, including nursing and hospital service, is of little avail if the means of subsistence cannot also be provided.

I have pointed out in earlier publications the evils that sick benefits bring in their train. The state will not condemn sick benefits for this reason, but will endeavour to reduce those evils to a minimum. This may be done by the appointment of medical referees with moderately autocratic powers. The manner of appointment will depend on the co-operation of those suitable for such a position. I think that I have made clear some of the points which must be considered by the medical profession, should health insurance become a fact in Canada. There must and will be free choice of family doctor. There should be free choice of consultants and specialists, but the economic factor will be paramount, and the state has an alternative which should be borne in mind.

We shall now turn to the question of what the public wants. At the present day, if faced by an emergency, any member of the public will tell you that he wants the best medical skill available. He is usually not in a position to estimate the possibilities of his being able to pay for it. Is he likely to ask any less, when he feels that by his contributions he has insured his health in such a way that the services of those of most skill should always be available?

May this not have repercussions which will endanger any scheme? Two suggest themselves. The sick man may demand that a specialist be called in many cases which could be handled quite satisfactorily by the general practitioner. On the other hand the general practitioner, if it does not affect his remuneration, will be only too ready to turn over a case to the specialist, even though quite capable of treating it himself. It does not require a laryngologist to treat a pharyngitis or a quinsy, nor a urologist for a simple cystitis or pyelitis.

When we begin to ask ourselves what the public is entitled to ask, we must first view the background. In England, with which many of my readers are familiar, the background differs materially from ours. Before the introduction of national health insurance, the methods of the club practices were very much those of mass production. Large numbers had to be dealt with; rapidity of handling patients, lightning diagnosis, low cost drugs, were factors of great importance in the successful operation of a club. No wonder that the benefits now supplied seem so much better. But would such a service satisfy our people? It would appear that it no longer satisfies the Englishman, for he is already demanding specialists and consultants.

I think I am justified in saying that the average Manitoban has enjoyed very excellent medical care. This he has received through three agencies— (1) the lofty ideals of the medical profession which has always been willing to give of its best to those unable to pay for it; (2) the hospitals, which insist on a high standard of service for those who avail themselves of their aids to rehabilitation of the sick; (3) the taxpayer who has to make up the difference between what the individual can pay and the cost of service. Under a contributory system, the doctor and the hospital are paid, and the taxpayer's burden is lifted. If the contributor has attended the out-patient department, or been a patient in the public ward, he will expect the same lavish attention of specialist, x-ray and laboratory as he has been accustomed to receive in the past. Can such be provided? Would the wonderful service provided by the public ward be justified if it were not for the teaching of students and scientific research? I think the answer would be that the average contributor would not be entitled to such a wide range, unless a comprehensive fee to the hospital covered everything, and the general practitioner would be required to justify his request for extra services and give his reason for his failure to make a diagnosis or cure his patient.

The intention of this article is to encourage study and discussion of a subject which is probably being given more thought by statesmen and politicians than we imagine. We ought to make ourselves familiar with some of the difficulties inherent in any scheme of health insurance. We should discuss them freely amongst ourselves. In this way we can be saved from the pitfalls into which medical men in other countries have fallen.

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THE VALUE OF PASTEURIZATION. — Dr. R. Veitch Clark, the Medical Officer of Health for the city of Manchester, has recommended his council to seek powers in their next Parliamentary Bill to compel pasteurization of the milk supply of the city. In his report Dr. Clark points out that from a public health point of view, pasteurization of milk is of value primarily for two reasons, *viz.*, to improve the keeping qualities of the milk and to destroy organisms present in the milk which are capable of producing disease in the consumer. During five and a half years (to 1931) 579 samples of pasteurized milk were examined for the presence of tubercle bacilli; 13 gave positive results. Examination of the pasteurizing plants from which these samples came showed that in almost every instance there had been an undue variation of the temperature of pasteurization on the day on which the sample was taken. No positive results were obtained in milks taken from pasteurizing plants where the mechanical efficiency was such as to maintain the temperature at an unbroken level. He also adds that careful pasteurization has an almost negligible effect upon the nutritive properties of milk, only vitamin "C" is injuriously affected and that not to a very serious extent.

# Case Reports

## A DERMOID TUMOUR OF THE OVARY*

BY MR. FREDERICK MARLOW, F.R.C.S. (ENG.),
*Toronto*

Miss B., aged 27 years, was referred by Dr. Peter McGibbon, of Gravenhurst, Ont., and admitted to the Wellesley Hospital on September 4, 1918. She presented a history of having had two severe attacks of pain in the lower right quadrant of the abdomen. The last attack had occurred about two weeks previously and had been followed by some difficulty in voiding urine. She brought with her some x-ray plates which had been made at the sanitarium at Gravenhurst, and in one of the pelvis there were two small suspicious shadows lying near the course of the right ureter. These shadows, together with the severe spasmodic character of the pain and two attacks separated by a considerable interval, led to a tentative diagnosis of ureteral stone.

Her general condition was good; she was inclined to be stout and felt quite well since her last attack of pain. On examination there was slight tenderness over the region of the appendix and lower down. Immediately above the pubes there was a sense of increased resistance; but no definite mass could be felt. The urine was normal. Pelvic examination without anæsthesia was refused.

Dr. Harold Tovell was asked to make a further x-ray examination. Nothing was found in the region of the kidneys and some difficulty was experienced in getting a clear picture of the pelvis. However, this showed the same small shadows as were discovered before. They were somewhat more distinct and seemed elongated obliquely. One was closer to the middle line than would have been expected had it been in the ureter.

The probability of ureteral stone was questioned and it was considered more likely that an explanation for the pain would be found in the appendix or right ovary. It was decided to make a pelvic examination under anæsthesia and to have the ureters catheterized if no lesion was found bimanually. This was done on September 11th.

On rectal bimanual examination there was no difficulty in discovering a tumour of considerable size, or about the size of two small oranges, joined close together, in the right side of the pelvis. The uterus was lying far back. Operation was proceeded with immediately through a mid-line abdominal incision. Exposure of the appendix was difficult and, when found, it was doubled on itself and quite firmly adherent. It was removed. The pelvic mass proved to be a dermoid tumour of the right ovary and its pedicle was markedly twisted. Adhesions had been formed between the tumour and the bladder and lateral pelvic wall sufficient to produce fixation and to prevent further rotation. The left adnexa were normal and the uterus was retroposed. Removal of the right adnexa, including the tumour, was performed and the round ligaments were shortened so as to bring the uterus forward. No abnormality of the right ureter could be detected. Following the operation the patient's progress was excellent. She was discharged from the hospital on September 23rd.

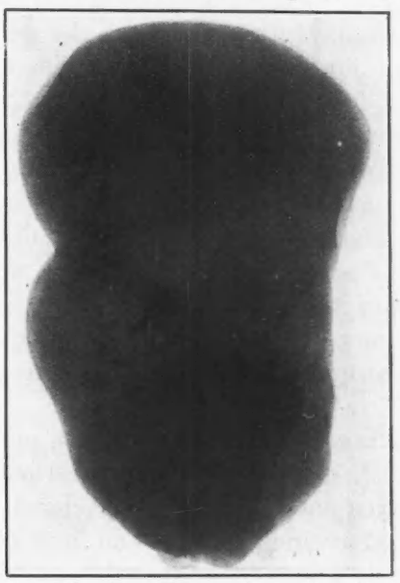

FIG. 1.—Miss B. X-ray of ovarian dermoid made September 12th, 1918.

Although much pathology was found and eliminated during the operation one naturally wondered as to whether the x-ray shadows were in or out. Hence on the following day the

* Read before the Section of Obstetrics and Gynæcology, Academy of Medicine, Toronto, February 4, 1932.

tumour was taken to Dr. Tovell, and x-ray examination revealed the same shadows as had been observed in the hostess and a few more smaller ones which had not been seen previously. Later, the tumour was taken to the laboratory of the department of obstetrics and gynæcology at the Toronto General Hospital where it displayed the ordinary contents of a dermoid tumour. The two larger osseous elements had the appearance of malformed teeth. (Specimen number 2024).

Dr. Tovell's combined report is as follows:—"There is no evidence of stone anywhere in the neighbourhood of the right or left kidney. There are, however, some suspicious shadows low down in the right side of the pelvis just about the junction of the ureter with the bladder. It does not appear, however, that these are ureteral stones, as they are not lying in the proper diameter. The plates taken in this region show a density which does not permit good vision. The cause of this is rather difficult to say." "Post-operation plates taken of the tumour show the same shadows which had been seen in the pelvis previous to operation. There are also several others which did not appear previously."

Had this case presented itself as a problem in differential diagnosis without previous x-ray examination one might have considered the two attacks of severe pain with an interval quite free from symptoms, the tenderness and slight resistance in the right lower quadrant, and a negative urine, as sufficient indication for bimanual pelvic examination, even if it had to be made under anæsthesia. Had this been done the diagnosis would not have been at all confusing. A week's time would have been saved. The pain would no doubt have been assigned to its exact cause in the rotation of an ovarian tumour and one would not have lingered in the valley of the shadows. But the character of the pains and the trouble in voiding urine after the second attack, even in the absence of previous urinary symptoms, and the absence of menstrual symptoms fully warranted x-ray examination, and, while expert interpretation of the shadows found was opposed to ureteral stones, as ordinarily located, the possibility of a displaced or badly bent ureter or even a pelvic kidney was not precluded. In most cases of ovarian tumour undergoing rotation the diagnosis is simple enough, as the history is strongly suggestive, and a vaginal or rectal bimanual examination is usually permitted and readily performed.

The writer has no idea as to the proportion of non-ureteral x-ray shadows found in the ureter regions that are due to osseous dermoid elements. Information on this would be interesting, but he has no idea of suggesting that x-ray examination should be more generally used in gynæcological diagnosis or of sounding a word of praise of some of the dexterous though meddlesome preliminary procedures adopted by some to bring into shadows organs which, whether normal or pathological, can be felt by experienced examining fingers. Gynæcology is a branch of medicine which, *par excellence,* demands careful and minute history taking, real and painstaking observation, and study of signs and findings on examination. Laboratory aid is of value, but x-ray methods are mostly inapplicable, except for ruling out non-gynæcological conditions. When a mistake in diagnosis is made, or, when a pre-operative diagnosis has later to be changed, some point in the compass of symptoms and signs has been missed, or, as is so often the case of the man lost in the woods, the compass is disregarded or actually disbelieved.

In reporting this case the writer takes the opportunity of urging his confrères and those who will follow, to read, mark, learn and inwardly digest, and metabolize into their systems, the symptoms and signs of gynæcological disease. It is only in this way that we can exclude errors from our teaching and our practice, or minimize them to a degree that will be devoid of harm to the people whom we serve.

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## ACUTE PERFORATIVE APPENDICITIS IN AN INFANT

BY D. SWARTZ, M.D.,

*Salvador, Sask.*

The patient, S.M., a girl, somewhat under two years of age, was brought to my office on June 14, 1931.

*Personal history* (as stated by her parents)—She was born by low forceps delivery. There was no injury, and she had the appearance of a normal infant. For the first three months she was breast-fed, during which interval she was difficult to manage and appeared very restless.

She was then weaned and placed on condensed milk for two months, followed by feedings of cow's milk. She cut her first teeth at the age of ten months (two lower incisors) and started to walk at eighteen months.

She had a tendency to be constipated from the time of birth to present illness. For the first three months her stool was green. From then to the tenth month it was yellow, but somewhat hard. Previous to her present illness she had had three definite attacks of pain and vomiting. The first attack was at the age of eleven months. Pain came on suddenly, evidenced by crying, restlessness and drawing up of limbs, and was spasmodic in nature. She had a green constipated stool and vomited gastric contents once or twice. The attack subsided in three days. A second attack occurred at 14 months and a third at 21 months. Both were very similar to the first attack.

*History of illness.*—This began on the evening of June 9, 1931. The first definite complaint was abdominal pain. Two hours later she vomited the gastric contents, followed by a more scanty vomitus. She had been constipated and was given a saline enema, which produced a green stool. The pain was colicky in nature, with intervals of relief lasting three to four hours, until the third day when it became continuous. On the morning of the fourth day she lay motionless and quiet as though in apparent comfort, but her general appearance made her parents apprehensive. The following day (June 14, 1931) she again complained of pain and refused to be moved. She was brought to my office the same afternoon.

*Physical examination.*—The child appeared rather dull and apathetic when undisturbed, but when touched she drew up her legs and cried. Her face presented a muddy pallor and staring expression. The chest showed no abnormality. She held her abdomen very rigid, although palpation during expiration revealed relatively increased right rectus rigidity. Examination under light ether anæsthesia indicated a definite mass discernible in the lower right quadrant. The temperature was 101.5° F. The leucocyte count was 20,000.

I made a diagnosis of appendicitis with perforation and suppuration. She was removed to the Unity Union Hospital, where I operated the same evening. Her temperature on admission was 105° F.; pulse 168; and respirations 56 per minute.

*Operation.*—A McBurney incision was made. On opening the peritoneum free pus was found, greenish in colour and foul smelling. The pus was soaked up in a moist sponge without disturbing the bowel. The appendix, although partially twisted so as to appear retro-cœcal, being bound by a few adhesions, was not difficult of access, and appeared at the site of the incision. There was a large perforation near the base. The pus, although profuse, was localized, having tracked down to the pelvis which appeared very shallow. Free in the pus cavity was a greyish yellow fæcal concretion about the size of a pea. The omentum could not be seen. The surrounding area was packed, the appendix released from the cœcum, then removed without disturbing the intestine. Because of the extreme friability of the tissues, the stump was not inverted. The appendix was swollen and tense distal to the perforation. It was somewhat twisted and deep red in colour. The perforation had ragged edges with a gangrenous appearance. Three drainage tubes were inserted along the ascending colon, stump of the appendix and pelvis. Culture of the pus revealed *B. coli.*

*Progress.*—The child was given 5 per cent glucose in saline solution (250 c.c., O.H. VI) for the first day, then per rectum, a few ounces at a time. Tr. Camph. Co., 3 minims per dose, was given for restlessness, and an enema on the second day with good results. After the first few days, the wound was periodically irrigated with Dakin's solution, and the drainage tubes were removed on June 18 and 19th.

From June 15th to 21st the temperature gradually fell from 105° to 99° F. From then to June 30th it rose to 102.5° F. By July 6th it descended to 98° F. and stayed around that level.

The child was discharged on July 18, 1931. She has been well ever since and no longer is inclined to be constipated—an ailment with which she was afflicted since birth. She has gained considerably and appears much brighter. She has developed a hernia at the site of drainage, which is being supported.

### COMMENT

Although this particular case was not attended to until the child had reached the age

of twenty-three months, it is evident from the history that she had suffered several previous attacks. The first of these noted by the parents was at eleven months. Further analysis of the history would lead one to believe that the child may have been afflicted even earlier than that. According to Gerstley,[1] 4 per cent of all deaths from appendicitis occur during the first five years of life, while only 2 per cent develop during that interval. Deiss reports one case under six months, one case from six to twelve months in 466 admissions, and 12 cases in 1,570 admissions from one to three years. A case of prenatal appendicitis was described by Hill and Mason. In 1917 Isaac Abt reported a case in a nine months' infant and collected 79 cases from the literature. In this series 20 were under three months; 6 from three to six months; 11 from six to twelve months; and 40 from one to two years.

The relative rarity of this condition in infants can be accounted for by certain anatomical and physiological features. (1) During the first two years of life there is a comparatively small amount of lymphoid tissue in the wall of the appendix. After the second year the lymphoid tissue grows and extends till it reaches a maximum at the age of twenty. (2) The toxicity of the intestinal flora alters as the child grows older. The virulence of *B. coli,* comparatively slight at birth, increases with age, probably due to the increasing complexity of the diet. (3) The thinness of the wall of the appendix in children predisposes it to early rupture.

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## PULMONARY LESIONS ASSOCIATED WITH ACUTE BACTERIAL ENDOCARDITIS OF THE TRICUSPID VALVE*

BY R. A. JONES AND G. LAUGHLEN

*Toronto*

The clinical course of the case here presented must interest both pathologists and clinicians. With the very gross lesion in evidence on the tricuspid valves one would naturally look for embolic manifestations in the lungs, but since in the many examinations there were no outspoken signs of valvular disease it was not to be expected that the consolidated area found in the lung in the early days of the illness would be ascribed to a tricuspid endocarditis. Nor, in fact, are we sure that the lung lesion found in the first part of the patient's illness was due to the endocarditis found subsequently at autopsy.

The illness of the patient seemed to begin suddenly on January 7, 1931, with chill, vomiting and sweating. He had been well and at work up to the day of the onset of his final illness. An area of consolidation was found in the left upper lobe, and from January 8th to January 13th the temperature ranged from 101° to 104°, dropping as if by crisis during the night of January 12th. There was a normal temperature for four days, and the pulse rate fell with the drop in fever. When the temperature and pulse rate began to rise again, the natural supposition was that some post-pneumonic condition was developing in the left lung, as the consolidated area had not seemed to resolve. Repeated punctures however, showed only some sterile fluid, until quite late in the illness when hæmolytic streptococci were grown from one of the specimens. Never more than a few c.c. of clear fluid were found at any of the punctures. Nothing but a faint systolic murmur had been heard in the heart, and this was more pronounced in the mitral area. Late in the course of the illness pericardical friction and pericardial effusion developed.

With the high intermitting temperature, and the late occurrence of chills, a pulmonary abscess was suspected, and subsequent signs in the lungs pointed strongly in this direction. After a stormy course, lasting exactly five weeks, the patient died and an acute bacterial endocarditis of the tricuspid valve was found. The edges of the valves and many of the chordæ tendineæ were eaten through. There was, in addition, a large mural thrombus in the ventricle. The massive endocardial lesions had given rise to an embolism of one of the large branches of the left pulmonary artery which in turn had caused several abscesses in this lung. There were infarcts in the lower lobe of the right lung, and there were the general signs of an acute infection in the other organs of the body. Under the skin were seen a few small hæmorrhages which had appeared in the last two or three days of the

*Presented at the Pathological Section, Academy of Medicine, January 26, 1932.

From the Wards and Laboratory of the Toronto East General Hospital.

illness. The smear from the growth on the tricuspid valves showed Gram-negative diplococci, but as these cocci refused to grow in culture it is difficult to say more than that one suspects they were gonococci because they had taken root on the tricuspid valve. If gonococci, we were unable to find their source, as the prostate was small in size, the urethra looked normal, and there was no gross evidence of infection in the epididymi or in the vesiculæ seminales. The possibility of these organisms being meningococci must be thought of, though it is probable that we would have secured a growth had this been the case.

The interesting problem in this man's illness would seem to be the explaining of the fever-free interval which ensued after the drop of temperature on January 12th. It would seem most unlikely in an acute bacterial endocarditis that there would be this afebrile interval, particularly if an already existing endocarditis had progressed to the point of giving rise to a pulmonary embolism and infarct large enough to suggest the onset of pneumonic consolidation. One might think on the other hand that two separate conditions may have existed, one an early pulmonary consolidation, pneumococcal or streptococcal in origin, which terminated by crisis in the ordinary way, and the other a secondary gonococcal infection of the tricuspid valve which developed during convalescence. The localization of this endocarditis of the tricuspid valve is, as we know, always suggestive of a gonococcal condition, though as yet it has never been clearly demonstrated why the gonococcus shows a preference for the right side of the heart. Cultures from the abscesses in the lung gave only a mixed growth of streptococci, pneumococci and staphylococci. As we know, it would be an extremely difficult matter to isolate a gonococcus from such a mixed infection as these findings would imply, while at the same time one would hesitate to assume that a gonococcus was able by itself to initiate a lung abscess.

# Clinical and Laboratory Notes

## INFLUENCE OF MUCUS ON PEPTIC DIGESTION*

By B. P. Babkin and S. A. Komarov,

*Montreal*

We found that the gastric mucus not only diminishes the acidity of the gastric juice but markedly inhibits the peptic digestion. Since the potency of pepsin acting at the same acidity plays a very important part in the rate of digestion of protein, this factor has probably a certain influence in protecting the gastric mucosa from destruction. We investigated Fogelson's mucin, and some other preparations of mucus which we obtained ourselves.

## THE INFLUENCE OF PYLORIC OBSTRUCTION ON GASTRIC SECRETION†

By J. Armour and D. R. Webster,

*Montreal*

Dogs were demonstrated with œsophagotomy, gastric fistulæ, pyloric obstruction and duodenal fistulæ. These were kept in good health for several months by intestinal feedings. There was no gastric secretion during the interdigestive period, but following the introduction of food into the intestine a secretion occurred lasting about eight hours and amounting to about 500 c.c. This secretion could be paralyzed by atropine.

During forty-eight hours' starvation the gastric secretion amounted to only about 80 c.c., mostly mucus. The dogs although in excellent health and spirits lost their appetite and refused food even after this period of deprivation. If alkalosis was permitted to develop, an increased secretion occurred, as well as œdema of the body and prostration which could only be cured by the administration of HCl.

## THE ISOLATION OF VITAMIN A

It is reported that vitamin A has been isolated by Prof. J. C. Drummond, professor of biochemistry in University College, University of London, in association with Prof. I. M. Heilbron and Dr. R. A. Morton of Liverpool University.

In their report to the Society of Chemical Industry, these investigators state that they obtained this elusive vitamin by splitting carotene into two products. They believe that one of the two products obtained by splitting carotene is vitamin A. They describe it as an alcohol and state that it contains no nitrogen and has a

* From the Department of Physiology, McGill University, read at the Montreal Physiological Society, April 25, 1932.

† A demonstration before the Montreal Physiological Society, April 25, 1932.

potency about equal to that of the newly discovered crystals of vitamin D.

At the same time these investigators reported that they have obtained from halibut liver oil a sticky, yellowish oil which is nine-tenths pure vitamin A.—*The Diplomate*, 1932, **4**: 65.

## RAPID STAINING OF SPIROCHÆTA PALLIDA IN PATHOLOGICAL TISSUES

The author gives the details of two rapid methods of staining for spirochetes in pathological tissues. One of them is a modification of the Armuzzi-Strempel method, and the other a modification of the Levaditi method. The first is the slower and requires about the same time as the Armuzzi method. The second requires only about four hours for staining and examination for spirochetes. Both of the methods use solution B of the classical Fontana stain as a reducing agent for the frozen sections, which are impregnated with the silver nitrate. In the second method 5 cubic centimetres of pure pyridin is allowed to act for an hour on the frozen sections fixed in formalin. Without washing, the sections are placed in 2 per cent silver nitrate for two and one-half hours in the thermostat at 37°. Then, without washing, they are placed in the Fontana B solution until they acquire a chestnut colour. The spirochetes can then be seen under the microscope.—Livio Burbi. *Pathologica*, 1931, **23**: 628.

## THE PURIFICATION AND CONCENTRATION OF DIPHTHERIA TOXOID

By AUGUSTUS WADSWORTH, JAMES J. QUIGLEY AND GRETCHEN R. SICKLES

This paper reports the results obtained in purifying diphtheria toxoid by precipitation with acetone at low temperatures. The precipitated toxoid was obtained as a dry powder, readily soluble in aqueous solutions. The powder itself appears to be stable. When dissolved in half the original volume of physiological salt solution, the toxoid remained stable in the cold room for a period of seven months. Only those toxoids should be used which have been completely detoxified by the treatment with formalin. The formalin is immediately and completely removed by precipitation with acetone.

Filtration through a Mandler filter, or the addition of a preservative to the toxoid, did not impair its activities. The flocculating value of the purified toxoid, containing phenol, was lowered considerably by freezing at -10°C., while when merthiolate was used as a preservative it remained unchanged. In refined toxoids diluted to half of the original volume, approximately 62 per cent of the nitrogen was eliminated with about a 15 per cent loss in flocculating value. By this method, the antigenic activity of a toxoid below standard, may be increased to a satisfactory standard.

The antigenic activity of the refined product, in the immunization of guinea pigs, may in general parallel its flocculating value, but the relation between the results of these tests may not be proportional nor constant. As an immunizing agent in the guinea pig, the refined product possesses an antigenic activity that is equal to, or greater than, that of the unconcentrated toxoid.—*J. Exper. Med.*, 1932, **55**: 815.

## THE DEMONSTRATION OF HÆMIN CRYSTALS

According to G. Bertrand the demonstration of hæmin or Teichmann's crystals is one of the most certain ways of detecting the presence of blood. He points out the difficulties in obtaining these crystals by the usual method of evaporating, with gentle heat, the suspected substance, after the addition of sodium chloride and acetic acid, and personally uses a solution of crystallized magnesium chloride, glycerol, crystallizable acetic acid, and distilled water. Its preparation, and the technique of manipulating it in preparing specimens, is described. The advantages of this reagent are: its syrupy consistence, which retards its flowing over the slide, as does pure acetic acid; minute specimens can be examined; and, permanent preparations can be made, owing to the presence of the magnesium salt and glycerol.—*Bull. de l'Acad. de Méd.*, 1931, p. 386, abs. in *Brit. M. J.*

## THE SPECIFIC DETERMINATION OF GLUCOSE

A strain of *B. proteus vulgaris* has been found to have a removal power for glucose in presence of other sugars, except galactose. The presence of galactose can be shewn by "galac" yeast. The removal of glucose by *B. proteus* is quantitative, and can be followed by any sensitive sugar reagent.—V. J. Harding and T. F. Nicholson, *Can. Chem. & Metallurgy*, 1932, **16**.

## THE MECHANISM OF SALIVARY SECRETION

Evidence was presented to show that stimulation of the para-sympathetic nerve (chorda tympani) to the submaxillary gland produces acetyl choline or an acetyl choline-like compound in the gland, as was shown by Loewi and co-workers to be the case for stimulation of the vagus to the heart. The presence of the acetyl choline was determined by assaying the perfusion fluid from the submaxillary gland on perfused frog hearts.—*Can. Chem. & Metallurgy*, 1932, **16**.

# Editorial

## ARE THERE TWO FORMS OF DIPHTHERIA BACILLUS?

DURING the past few years reports have appeared from various parts of Europe concerning a virulent form of diphtheria, with a high mortality rate, and showing poor response to serum therapy. This is in rather striking contrast with our generally accepted optimism as to the value of anti-diphtheritic serum. Deicher and Agulnik, for example, record a rise in the case mortality of diphtheria in the Virchow Krankenhaus of from 5 per cent in 1924 to 26.7 per cent during the first five months of 1927. The apparent inefficacy of the antiserum in controlling the severe cases has led in certain quarters to much criticism of its use. There appears to be some factor with regard to the bacillus or the serum which requires elucidation, and some recent work has been done by McLeod *et al.** in an effort to throw light on the subject.

These workers claim to have been able to demonstrate the existence of two distinct forms of diphtheria bacillus. These they have named *gravis* and *mitis*. They differ very definitely and strikingly in their cultural reactions, and are by no means interchangeable. Added to these is an intermediary form which also appears to have constant characteristics, and is not found in conjunction with the others. It would appear that there exists some relationship between the *gravis* and the *mitis* forms and the clinical manifestations of the disease. The *gravis* is associated with the severe toxic, often fatal, cases, while the *mitis* is found in the milder forms of the disease. Again, the *gravis* forms practically always show some degree of virulence, while the *mitis* are not infrequently avirulent. It is suggested also that the sporadic, endemic diphtheria is due largely to the *mitis* form, while the *gravis* contributes to the severe epidemic type.

Granting the presence of these two forms of organism, the question may be asked: will the stock serum in common use neutralize the virus of the *gravis* form as efficaciously as it does the virus of other forms of the organism? If the neutralization is equal in both cases, then the increased mortality noted in recent years cannot altogether be attributed to the presence of the *gravis*. Unfortunately, however, McLeod does not answer this question, and the question as to the cause of the increased mortality is, therefore, still an open one.

So far, there does not appear to be any published work on this subject on this continent. Either the *gravis* form does not exist over here, or it has never been isolated. Clinically virulent cases of diphtheria have been described rather frequently in Montreal within the last twelve months, but efforts to isolate the *gravis* form of organism from them have been unsuccessful. There are other possible explanations for the failure of the serum to control severe cases: the dosage may be insufficient; the serum may have been allowed to deteriorate: in occasional cases it may be given too late for any possibility of being effective.

P. N. MACDERMOT

* *J. Path. & Bact.*, 1931, **34**: 5.

## THE COST OF GERMAN MEDICAL JOURNALS

AN interesting analysis has been made by Messrs. Robert and Schaltenbrand* at the library of the College of Physicians and Surgeons of Columbia University regarding the comparative costs of medical journals. Whilst the matter is of interest chiefly to librarians, it also brings up points of importance to the profession in general.

The inquiry referred to was undertaken because the library's budget was found frequently to show a deficit, which was always in connection with the appropriations for subscriptions to journals. It was further ascertained that the estimated cost fell short in one particular group of journals alone, those from Germany. In the case of the American, British, French and other journals the allowance made was always exactly enough. What was the difference?

* *Bull. Med. Lib. Ass.*, 1932, **20**: 140.

To anyone with experience in buying German journals it is well known that the methods of the German medical publishers are both unusual and annoying. If one subscribes to an American or Canadian journal, let us say, one knows beforehand what the cost for one year's publication will be, and the minimum number of issues to expect. Not so in Germany. There the output of many medical journals for the year is sold at so much per part or volume, as it is issued, but—and it is a rather large "but"—the number of these parts or volumes is not announced beforehand. Therefore, in the case of a given journal one may pay more for one year's issue than in previous years without even having the consolation, slight as it may be, of knowing beforehand how much it will be. Indeed, the report frankly avers that "the number of volumes printed annually is gauged by the capacity of the subscribers to absorb the output without too much indignation or open protest". That is strong language, even from librarians(!), and it is only slightly modified in their next sentence: "It may be truthfully stated that the prices of German journals are made, not always according to the cost of production, but in direct proportion to the known number of subscribers for each journal." In support of this they quote the German publishers' warning to libraries against cancellation of orders, as any decrease in the numbers of subscriptions would lead to an increased price for the remaining subscribers.

The report contains some surprising figures relating to the cost of German journals compared with those from all other countries. For example, the percentage of cost of journals to the Library for 1930 was, American 12.7; British 9.0; French 4.2; German 70.7; miscellaneous 3.4. The most expensive American journal cost $30.00; the most expensive German journal cost $173.30. The average cost of the American journals was $7.91, of the British $11.70, of the German $36.41.

Beyond doubt some of the German publications are of the very highest quality in their scientific content, their printing, paper and illustrations. But other countries have equally high standards, at much lower prices. And Germany, just as much as other countries, also produces some very indifferent writing. One of the complaints commonly made about German writing is that the articles are often so very long. The explanation in part is that in Germany contributors to medical journals are paid so much per page, and the temptation to be verbose becomes doubly strong.

It looks as if the libraries have reached the limit of their patience, not to call it generosity, with German medical publishers. Conditions on this side of the Atlantic are making it impossible to keep up with the present German prices. Even under better conditions the excessive prices should never have been accepted. We would lose heavily if we had no German journals, but surely a more reasonable assessment of their value is possible. It is to be hoped that the Medical Library Association will be able to work out a plan by which these high costs will be reduced.

H.E.M.

## Editorial Comments

### Cancer of the Lung

Observers in many parts of the world have been drawing attention to a steady increase in the number of deaths due to cancer during the past few years. Whether this increase is an actual increase or merely an apparent one is, for the present, a moot question. Excellent authorities could be quoted on both sides. Those who think that the increase is apparent rather than real believe that it is accounted for sufficiently by greater accuracy in diagnosis, by more accurately recorded statistics, and by the fact that more people nowadays are reaching the cancer age. The most recent study of the question is contained in a paper by Dr. Madge T. Macklin, of the University of Western Ontario, read at the meeting of the Royal Society of Canada last May. Dr. Macklin has taken the statistics for Canada, for the years 1901 to 1921, and has divided the fatal cases of cancer by age-groups. She concludes that the evidence in hand, so far as it relates to Canada, points to a very definite increase in actual cancer mortality. This is due in little measure to the increase in the average age of the population as a whole. The increase is more evident still when the cancer rates are based upon the population falling within the cancer age. It is not

due in large part either to better diagnosis or to better recording of statistics. She thinks that the main factor responsible for the increase of cancer is the prevention of deaths after people have reached the age of forty, from infectious diseases, surgical operations, and from such conditions which the present-day advanced medical and surgical knowledge might be expected to ameliorate. On the other hand, recent communications from Switzerland and some of the Scandinavian countries are to the effect that cancer in these regions is not actually increasing. It would appear that the study of the matter must continue for some time longer before the question can be finally settled. Local influences seem to be at work. Later statistics should be studied.

When it comes to cancer of the lung there is greater unanimity of opinion. Most authorities believe that this affection is actually more common than it used to be. This conclusion is based not only on statistics but upon post-mortem evidence. A recent worker, Dr. Dinko Sučić, of Jugoslavia, states[1] that at the pathological institute of Zagreb University it has been found that pulmonary cancers have increased from an average of less than 6 per cent of all cancers in 1923-25 to more than 18 per cent in 1929. This finding assumes special importance when it is pointed out that Jugoslavia is an agricultural country, some 80 per cent of its population being engaged in farming and kindred pursuits. It goes to show that the incidence of cancer of the lung cannot be linked up with pollution of the atmosphere as a result of motor traffic and industrial pursuits.

It has been suggested, with some plausibility, that the dust from tarred roads, the exhaust gases from motor cars, and factory smoke, to mention perhaps the chief causes of atmospheric pollution, are responsible for this increased prevalence of pulmonary cancer. Sučić's investigation invalidates this explanation. He thinks that there must be diverse factors at work, indirectly, in the matter of carcinogenesis, all of which must, however, be of the nature of irritants to the bronchial mucosa or alveolar epithelium. It is difficult to believe, however, that a number of diverse factors could be in operation equally in such diverse regions, both urban and rural. It would appear that pollution of the air cannot be an important factor.

One factor of a much more widespread character might be invoked as of importance in the etiology and pathogenesis of pulmonary cancer. This is cigarette smoking. The consumption of light cigarettes, according to Hoffman,[2] has more than doubled in the period between the years 1918 and 1928. Carcinoma of the lung, in fact, is much more prevalent in men, who are the chief smokers, than in women, though, it is true, the latter have taken up the habit with some fervour. Carcinoma of the lung is not unknown among women, it may be added. The combustion of the tobacco, and particularly of the paper in which it is wrapped, liberates tars, acetic and pyroligneous acids, and creasote, all substances that are competent to irritate a delicate mucosa. In this particular the habit of "inhaling" is of special importance. At the present time there is no evidence, experimental or other, tending to incriminate the use of tobacco as a cause of pulmonary carcinoma. On the other hand it must be admitted that here is a possible source of danger. The subject requires further investigation. A.G.N.

1. Sučić, *Wien. Arch. f. innere Med.*, April, 1932.
2. Hoffman, Cancer, Phila., 1931, p. 50.

### The Toxic Powers of Phenolphthalein

Phenolphthalein is a drug so widely used that it is well to call attention to the fact that it is not always innocuous. Purpura, collapse, and even uræmia have been found as a result of its administration (Lauze, 1924). Faintness, vertigo, cyanosis and hæmorrhagic stools have been noted several times. Many of the cases published are incomplete, in that the dosage is not indicated nor the length of time that had elapsed after taking the drug before the toxic signs appeared. In one case, occurring in a man of sixty years, as small a dose as one-tenth of a gram resulted in severe purpura and other manifestations after a few hours. It would be well for medical practitioners to keep in mind the toxic powers of phenolphthalein, for it is evident that doses well within what are now regarded as therapeutic limits may be dangerous. The *Journal* would welcome any information that practitioners can furnish on this important matter. A.G.N.

### An Additional Note on Fragilitas Ossium

In our editorial last month[1] on the subject of fragilitas ossium it was stated that no case had been reported in our *Journal* since 1917. This is an error. Dr. H. P. Wright,[2] of Montreal, reported two cases in brothers, and Dr. C. W. Burns,[3] of Winnipeg, reported six cases, in a father and five sons.

Dr. Wright's cases are of interest because of the inbreeding of the parents. The mother of the patients married her uncle, and the maternal grandmother of the patients also married her uncle. No new strain had been introduced in three generations. Studies, conducted by Dr. I. M. Rabinowitch, showed no particular disturbance of nitrogen, salt or carbohydrate metabolism. The output of cal-

1. *Canad. M. Ass. J.*, 1932, **26:** 714.
2. Wright, *Canad. M. Ass. J.*, 1921, **11:** 427.
3. Burns, *Canad. M. Ass. J.*, 1921, **11:** 522.

cium was equal to or faster than the intake. In Dr. Burns' cases antecedent consanguinity does not seem to have been a factor.

It is noteworthy that all the cases reported by Drs. Wright and Burns occurred in males; the females of the family escaped. Further, Dr. Burns found that in the family tree studied by him the tendency to fragility was transmitted by the female line and manifested itself only in the males. The father of the family had two sisters, neither of whom had fractures; one sister married and had a family of girls, none of whom manifested the condition; the other sister married and had three boys, all of whom developed fractures. This line of transmission, which is strikingly like what is met with in hæmophilia, is not, however, invariably found. A.G.N.

### H. M. Stationery Office

Frequent references are made in our *Journal* to publications of importance emanating from His Majesty's Stationery office in London. It may be of assistance to those interested to know that these publications can be obtained in Canada through the following agencies:—

The Imperial News Company, Ltd., 235 Fort Street, Winnipeg; 975 St. Antoine Street, Montreal; 517 Burrard Street, Vancouver; Wm. Dawson Subscription Service, Ltd., 70 King Street East, Toronto.

## Special Articles

### THE ORIGIN OF THE CONCEPTION OF THE NERVOUS IMPULSE*

BY CHARLES ROSEN, B.A.

*Montreal*

In spite of the fact that an adequate knowledge of the structure of the nervous system has been obtained only within comparatively recent years, theories concerning the nature of the nervous impulse have been propounded for centuries. These speculations always bore a close relationship to investigations of muscular contraction, for the intimate functional connection between nerve and muscle was early appreciated. Until comparatively recent years the phenomenon of muscular contraction was explained by the presence of some fluid or principle which, passing down the nerve and entering the muscle, distended it and thus caused contraction. Theories of this nature held sway till the end of the eighteenth century, when they were gradually superseded, and the modern conception came into being. This considers the nervous impulse to be a transference of energy along the nerve fibre, the energy being similar to, though not identical with, electrical energy.

The importance of the brain was recognized at an early date. Plato placed the seat of thought and feeling in the brain, but, strange to say, his pupil Aristotle (384-322 B.C.), contrary to medical and popular opinion of his time, regarded the heart as the seat of feeling and intelligence, conceiving of the brain merely as a cooling agent for the heart, a process carried out by the secretion of phlegm, or pituita.

The Alexandrian period is to be considered next. Very little of the literature of that period is extant, but we know, from references by subsequent authors, that two men dominated medical thought. These were Herophilus and Erasistratus, who flourished about the year 300 B.C., under the first two Ptolemies. Herophilus, of Chalcedon, has been called the "Father of Anatomy", being the first to dissect the human body in public. He did extensive work on the brain, and many parts of the brain still bear the names he gave them. He recognized the brain as the bodily seat of intelligence, and was the first man to understand the nature of the nerves. He ascribed to nerves the functions of sensation and movement, though he did not distinguish them clearly from sinews and tendons. Erasistratus, the "Father of Physiology", also investigated the nervous system. He divided nerves into those of sensation and movement, and came to the distinctly modern conclusion that complexity of cerebral convolutions was associated with a high degree of intelligence.

Erasistratus' theory of nervous action forms part of his general physiological theory, which in turn is closely related to his philosophy. He believed in the atomism of Democritus, to which he added the conception of "pneumatism", according to which the organism is permeated by a subtle vapour, the "pneuma"; this pneuma is associated with vital phenomena. Erasistratus observed that every organ was provided with an artery, a vein and a nerve, which structures divide to the limit of vision. According to Erasistratus, these subdivisions went on beyond this limit, and all the organs were actually composed of these subdivisions. Nourishment and movement are brought about by the action of blood and two kinds of pneuma. Air is taken into the lungs, and passed to the heart. There it is changed into the pneuma known as "vital spirit", which is mixed with the blood and carried to various parts of the body by the arteries. In the ventricles of the brain, the vital spirit is further changed into animal spirit, which is carried to different parts of the body by the hollow tubular nerves. The animal spirit initiates vital phenomena; for example, muscular

*From the Department of Anatomy and the Osler Library, McGill University.

contraction is due to distension of the muscle by animal spirit, conveyed to it by the nerve. Here, then, we have enunciated for the first time the theory of animal spirit, a theory which in different forms was to hold sway till the end of the eighteenth century.

Due to the practical and empirical nature of the Roman mind, little progress was made in theoretical science during the Roman epoch. The only outstanding medical investigator was the Greek Galen, of Pergamum (A.D. 130-200). He was not only a great physician but also a clever investigator, and though his conclusions were often hasty and erroneous, they dominated medicine, for better or for worse, for almost fifteen centuries. Galen's best work was that done on the physiology of nerve and muscle. His appreciation of the connection between muscle and nerve is shown in the following rough translation of a passage in *De Motu Musculorum:* "for by cutting, pressing on, crushing, tying, injuring by a scar, or destroying (the nerve), we remove from the muscle all movement and sensation." The same book contains an account of his experiments on the central nervous system of animals. He demonstrates the effects of cutting the spinal cord at various levels of the body.

According to Galen, the blood reaching the brain is there endowed with animal spirits, or "the breath of life". This is the noblest of all the body spirits, and being carried from the brain through the nerves, which were believed to be hollow tubes, it initiated the higher functions of the organism, such as movement and sensation.

During the Middle Ages, the science of medicine degenerated into a mere calendar of drugs, symptoms, and incantations. All scientific inquiry perished, for men were more concerned with their future happiness in the next world than with the facts and events of this. Towards the sixteenth century, however, signs of a scientific revival became evident; and one of the first men to rebel against the authority of Galen and to evince the modern spirit of scientific skepticism was Andreas Vesalius, of Brussels (1514-1564), often referred to as the founder of modern anatomy. His *De Corporis Humani Fabrica,* printed in 1543, contains an accurate record of a great number of discoveries and investigations, mainly anatomical. Although Vesalius rejected many of Galen's anatomical descriptions as either inaccurate or false, he believed in the Galenic physiology. According to him, animal spirit is elaborated by a special power of the brain in the lateral ventricles and in the third ventricle. From the latter, the spirits entered the fourth ventricle, whence, as he says, "no mean portion of the animal spirits is directed into the dorsal medulla and into the nerves springing from it. From the other ventricles of the brain, however, the spirits are carried into the nerves springing directly from them, and so to the organs of sense and voluntary movement."

The following quotation is significant, since it shows Vesalius' tendency to avoid definite conclusions on subjects concerning which he had no scientific evidence. "Meanwhile, we will not too anxiously discuss whether the spirits are carried along certain hollow channels of the nerves, as the vital spirits are carried by the arteries, or whether they pass through the solid material of the nerves, as light passes through the air. But in any case it is through the nerves that the influence of the brain is brought to bear upon any part, so far I can certainly follow out the functions of the brain by means of vivisections, with great probability, and indeed truth." Vesalius's experiments and vivisections told him that the nervous system was intimately bound up with sensation and movement, but it told him no more. Hence, although he adopted the hypothesis of animal spirit, he refused to speculate on the nature of these spirits, and, unlike other medical investigators of his time, he refused to discuss the nature of the soul and kindred matters concerning which his experiments told him nothing.

The physical discoveries of the sixteenth and seventeenth centuries led to attempts to explain vital phenomena on purely mechanical grounds. One of the first and most influential representatives of this school, known as the Iatrophysicists, was René Descartes (1596-1650).

Descartes was primarily a philosopher. He had little physiological training, yet in order to prove his mechanistic philosophy he drew a mental picture of a most elaborate machine, in which all bodily processes, including motion and sensation, were carried out on purely mechanical principles, under the supervision of the soul, which resided in the pineal gland. The bodily principle involved was the animal spirit, a subtle fluid amenable to physical laws. The animal spirit was elaborated from the blood in the vicinity of the pineal gland, which, together with the ventricles of the brain, formed a reservoir for these spirits. The animal spirits, passing down the cord and into the hollow nerves, fills the muscles in accordance with definite laws, and so brings about movement. To quote Descartes' own words: "Or à mesure que ces Esprits entrent ainsi dans les concavitez du cerveau, ils passent de là dans les pores de sa substance, et de ces pores dans les nerfs; où selon qu'ils entrent, ou mesme seulement qu'ils tendent à entrer plus ou moins dans les uns que dans les autres, ils ont la force de changer la figure des muscles en qui ces nerfs sont inserez, et par ce moyen de faire mouvoir tous les membres."

Sensation is explained in the following manner. The nerves contain within their tubes thread-like structures, which do not quite fill the nerve, thus allowing room for the animal spirit to travel down the nerve. These threads are attached peripherally to the sense organ, for example, the skin, and centrally to the brain or cord. Stimulation of the skin at a point pulls on one or more of these threads, the pull is transferred up the

thread to the central nervous system, and finally opens a minute pore in the ventricles of the brain. Thus animal spirits are able to travel down the nerve or nerves to the appropriate muscles, and the appropriate movements are carried out.

Descartes enters exhaustively into such questions as respiration, digestion, deglutition, reciprocal innervation, and so forth, and every one of these processes is explained on mechanical grounds, and by the intervention of animal spirits. Even the higher mental processes are explained on purely physical principles, the rational soul merely carrying out the function of supervision. Descartes was primarily concerned with proving his philosophical theories, and many of the anatomical facts he assumed were later found on investigation not to be facts at all.

The work of Giovanni Alfonso Borelli (1608-1679), another iatrophysicist, was more lasting, and his influence more far-reaching. Borelli was much influenced by Galileo, and attempted to give mathematical expression to physiological processes. His best work was his investigation of muscular contraction. In his book *De Motu Animalium* we find expressed his views concerning muscular contraction and nervous action, with the latter of which we are primarily concerned.

Borelli called the animal spirits the "succus nerveus", which has a liquid consistency. The nerves are not hollow tubes, but are filled with a spongy material, which can easily be moistened by this succus nerveus. The following quotation from *De Motu Animalium* is self-explanatory, and will demonstrate his theory of nervous conduction, it being understood that Borelli conceived of muscular contraction proper as being a chemical process, while the actual transference of the nerve impulse was a physical process. "Hence it follows that the fibres or spongy ducts of certain nerves turgid with the spirituous juice can be shaken or pinched by that gentle motion of the spirits by which the . . . commands of the will are carried out, and then, by concussing the whole length of the nerve through the convulsive irritation, can squeeze out and discharge from their extreme orifices some spirituous droplets into the appropriate muscle, whence the ebullition and explosion follow by which the muscle is contracted and rendered tense."

Sensation is explained in a similar manner. When the various sensory nerve endings are struck, the concussion is communicated to the brain, and there "the faculty of the sensitive soul according to the region thus percussed, according to the vehemence of the blow and the fashion and the mode of the motion, is able to form judgment concerning the object causing the movement."

Another man who did much work on the nervous system was Thomas Willis (1621-1675). Willis' conclusions were often erroneous, as he was not a clear thinker, and preferred rhetoric to logic, but since he was one of the foremost physicians of his time, and since he made some important studies of the anatomy of the brain, his theory of the animal spirits is worthy of examination. Like Descartes, he regarded the human body as a machine, the workings of which could be explained physically.

According to Willis, the soul manifests itself in two places and in two ways. In the blood, the soul was of the nature of flame; in the brain and nervous system, it was of the nature of light. The animal spirits, being the manifestation of the soul in the brain, are of the nature of light, and are prepared from the "subtler" parts of the blood in the cortex of the cerebrum and cerebellum; those prepared in the cerebrum are designed for voluntary motion and sensation, those prepared in the cerebellum are destined for involuntary movements. The nerves, according to Willis, are not tubes, but solid fibres, and the animal spirits pass along them as spirits of wine pass along the stretched dry strings of a fiddle. If either extremity of the cord be struck, a movement of animal spirits is initiated; this movement gives rise to motion or sensation. The impulse is not transmitted by an actual displacement of animal spirits, but motion is communicated from one particle to the next as these are ranged along the nerve fibre.

Muscular contraction is of the nature of an ebullition or explosion within the muscle, and occurs, in Willis's words, in the following manner: ". . . the animal spirits, being brought from the Head . . . are carried by their passage into the tendinous fibres, and there they are plentifully laid up as in fit store-houses; which Spirits as they are naturally nimble and elastick, where ever they may, and are permitted, expanding themselves, leap into the fleshy fibres; then the force being finished, presently sinking down, they slide back into the Tendons, and so vicissively."

William Croone (1633-1684), one of the founders of the Royal Society of London, also argues, in *De ratione motus musculorum*, that muscular contraction occurs through the agency of a "spirituous liquor" passing from the nerves and interacting with substances in the muscle. He also said that the soul acts through the nerves, which, in his words, are composed of "a certain medullary substance full of juice, with a double membrane which surrounds that substance and also an infinite number of little cords within these membranes and medullary substance, extended from their beginning to very extreme capilliments, which are dispersed and inserted into various parts of the muscles."

Just as the new physics influenced physiology, so did the chemical advances of the period lead certain men to interpret physiological processes in terms of chemistry. These men were known as the iatrochemists, and one of the founders of the Iatrochemical school was Jean Baptiste Van Helmont (1577-1644). Van Helmont, in his book *Ortus Medicinæ*, distinguishes six digestions, each of which is of the nature of a fermentation. Space does not permit of a full

discussion of Van Helmont's views, but for our purpose it is sufficient to note that he does not distinguish between vital and animal spirits, since, as he says, "the same blood with the same vital spirits, vitalized blood, is carried to all the tissues." Finally, the soul is situated in the pylorus, and acts on the body through messengers called "Archæi", the chief of which resides in the pylorus.

Another representative of this school was John Mayow (1643-1679). According to Mayow, the air was filled with nitro-aërial particles, which formed the essential element in respiration. These nitro-aërial particles formed the animal spirits, which, descending along the nerves to the muscles, united chemically with the "sulphureous" particles within the muscles. The union was of the nature of a fermentation, and produced contraction and hence movement. Rapidity of respiration during muscular exercise was due to a need for more nitro-aërial spirits to replace those used up during muscular contraction. The nitro-aërial spirits are supplied by the brain, and the sulphureous particles are brought by the blood. "And," he says, "not only for muscular motion but also for sustaining life itself, it seems that there is need of an ample supply of animal spirits; for it is possible that life cannot be sustained without a certain series and continuous flow of animal spirits passing constantly through the brain, or at all events through the cerebellum. And that is the reason why, if the respiration or the motion of the heart or of the blood be stopped even for a moment, the animal at once dies."

During this period, the doctrine of animal spirits did not go entirely unchallenged, for Glisson (1597-1677) and Jan Swammerdam (1637-1680) each showed that during muscular contraction the volume of the muscle actually decreased, so that the passage into the muscle of a fluid was impossible. But for one reason or another their work was unheeded, and it was not till the time of Haller that the doctrine of animal spirits began to disappear.

Swammerdam was the first to use the "nerve-muscle preparation". Being led to doubt the truth of the animal spirits theory on purely theoretical grounds, he carried out a simple experiment with a nerve-muscle preparation of a frog, and showed conclusively that the volume of the muscle decreased during contraction. As a matter of fact, Swammerdam could and did contend on purely theoretical grounds that the mere fact that one could get a muscle to contract when severed from the body showed that the theory of animal spirits passing into the muscle from the brain was wrong. His work on the subject, however, was not published till long after his death, so that it had no influence on his contemporaries.

Glisson, in his *De ventriculo*, advances the theory of irritability, and shows that the property of contraction is inherent in the muscle. By experiment, he shows, like Swammerdam, that a muscle loses in volume during contraction, and that the passage of animal spirits into the muscle was hence impossible. His work, like that of Swammerdam, was not heeded.

Albrecht von Haller (1708-1777), whose *Elementa physiologiæ* is a large and exhaustive text-book on physiology, revived Glisson's theory of irritability. The inherent contractile power of living muscle he called the "vis insita", as opposed to the "vis nervosa" of the nerves, which supply the stimulus for muscular contraction. Haller shows that the nerves are essential for movement and sensation. "But," he says, "the manner in which the nerves execute motion in the muscles, is so obscure, that we may almost despair of discovering it." Further on, he says, "This force of attraction, which is implanted by nature in the living fibre, is excited and increased by stimuli. The rest is mere hypothesis."

In his discussion of the nervous system, Haller speaks of the various theories of nerve conduction current in his time. Among others, he discusses the theory of Nicholas Robinson, who supposed that the sensory nerves, when struck by an outside impression, were thrown into vibrations, and so conveyed the impression to the brain. Haller rejects this view on several grounds, among which is the purely physical fact that the nerves, owing to their soft consistency, cannot possibly set up the vibrations described by Robinson.

Haller himself adopts the view that the nerves are hollow tubes, conveying a fluid. He carefully considers all the objections advanced against this theory, but none of them seem to him irrefutable. Concerning the nature of this fluid, however, he is in doubt. He rejects various theories, among them the notion that it is electrical, since, he says, "a ligature on a nerve takes away sense and motion, but does not stop an electrical current." His final conclusion is that this nervous fluid is "an element of its own kind unlike anything else." This element cannot be grasped by any of the senses, but is known to us only by its effects. Furthermore, the same fluid serves both for motion and for sensation, for, he says, "if sense sometimes remains after motion is destroyed, this seems to be because much more strength is required for the latter. Dying people hear and see when incapable of motion."

Towards the end of the eighteenth century, Luigi Galvani, of Bologna (1737-1798), discovered that nervous action could be induced by electric phenomena, and thus discovered the electric current. At the time, it was thought that some kind of animal electricity had been discovered, and it was called galvanism. At any rate, Galvani's discovery opened up a new department of physiology, namely the application to living tissues of electrical phenomena.

In 1800, Alessandro Volta (1745-1827) showed that there is nothing of a specifically animal nature about galvanism. He also showed how electrical stimulation of nerve threw the muscle into convulsions.

For some time it was believed by most physiologists that the nerve impulse was identical with electricity. Such was the view of Du Bois-Reymond, who discovered the demarcation current and the action current in nerve and muscle, and who demonstrated the accompaniment of the nervous impulse by changes in electrical potential. Even those physiologists who did not believe in Du Bois-Reymond's theory nevertheless believed that the nerve impulse was comparable to light or electricity, and that its velocity could not be measured. In 1852, however, Helmholtz succeeded in measuring the speed of the nerve impulse in the sciatic nerve of a frog, and found that its velocity was much less than that of electricity, about 27 to 125 metres per second. This proved, at any rate, that the nervous impulse was not identical with electricity.

Until the beginning of the twentieth century, it was generally believed that the propagation of the nerve impulse was a purely physical process. Until the early twentieth century, no chemical processes were demonstrated. About this time, however, Tashiro, by the use of very delicate apparatus, was able to show that a nerve fibre gave off minute amounts of carbon dioxide, and that this amount was increased during functional activity of the fibre. Tashiro further demonstrated the presence of a physiological gradient in the nerve fibre, showing that physiological activity tended to diminish along the length of the fibre in the direction of the normal conduction of the impulse. It is, therefore, believed to-day that nervous conduction is a physico-chemical process, but the exact nature of the process has not been settled.

Lillie's theory is interesting. He draws an analogy between nervous conduction and the behaviour of inert iron. If a piece of iron wire rendered inert by the action of concentrated nitric acid be scratched at a point, the point acted on is reduced when immersed in hydrochloric acid. A wave of negative potential is set up along the wire, from point to point, bubbles of gas being evolved. The local current between the active and the passive particles of iron serves as a stimulus, so that the passive area is reduced, a new active spot is exposed, and so on. According to Lillie, the process of nervous conduction is analogous. On the axon there is a surface film of unstable reducible matter. A stimulus acting at a point reduces the film at that point, which is now electrically negative to the adjacent passive portion. And so the impulse is propagated along the nerve fibre. After the passage of the nerve impulse, the nerve returns to its former resting state. This theory serves to explain the necessity for oxygen during the period of restoration, and shows the necessity of oxygen for the maintenance of irritability.

This completes the account of the origin of the conception of the nervous impulse. Due to limitations of space, much material has had to be excluded, and it was necessary to omit the pathological and philosophical systems of which theories of nervous action usually formed only a part, though a very important part. An examination of past theories of nervous action provides us with an example of the general truth that in science multiplicity of positive assertion is often inversely proportional to the amount of actual knowledge concerning the subject in question. In spite of his inadequate knowledge of the anatomy of the nervous system and his ignorance of its functions, Galen was more positive in his statements concerning nervous action than is any physiologist to-day.

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Among good things I prove and find
The quiet lyfe doth most abounde,
And sure to the contented mynde
There is no riches may be founde.

—*Songs and Sonnetes.*

# SYPHILIS: A SPECULATIVE ESSAY

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In the primary stage of syphilis, before the blood shows any evidence of infection, one course of treatment of only moderate intensity seems to be effective in checking the development of the disease and may possibly eradicate it. If the disease does recur, it does so in the form of a primary sore and is again amenable to the same form of treatment. Such is the rule in most cases, but there are exceptions, an occasional case recurring as a chancre, but accompanied by or very quickly followed by secondaries. It is presumed that these cases were almost on the verge of the generalized disease, although the blood reaction was negative. No such good fortune is the rule in the secondary or generalized stage, for while an exceptional patient may show a negative blood reaction after treatment, and remain negative for years in apparently perfect health, most require repeated treatment for recurrences, often in the form of actual lesions, but more frequently as indicated by a positive Wassermann or Kahn reaction. These are the facts, but they need some reasonable explanation.

If it is admitted that the spirochæta pallida is the infecting agent, it seems extraordinary that in the early primary stage all the microbes can be killed, whereas in a later stage they cannot. It is true that in the generalized stage there must obviously be a greater volume of growth, but as a drug like salvarsan or its derivatives is perfectly effective in causing the symptoms to disappear the microbes have apparently been just as vulnerable as those in the primary sore. It might be thought, however, that as the number of parasites must be enormously increased the remedy has not been wholly effective and many have escaped. That all the different parts of the body, even of an organ or tissue, are not constantly receiving the same volume of blood is a well established fact. In certain areas the capillaries may be quite contracted and only dilate on the appropriate stimulus, or when the products of an indolent metabolism have increased sufficiently to provoke a response or dilatation. This point of view has been discussed by Almroth Wright, and he suggested the exhibition of a drug which would open these closed areas. In these regions the parasites might remain secure or at least unharmed by any concentration of the drug which would be likely to penetrate to their lair. Not very different is the idea that the parasites might and probably do reach parts of the body which are composed largely of supporting or fibrous tissues and have only a feeble blood supply. The walls of arteries are presumed to be such places, and here they may not suffer unduly from the lethal effects of any drug, or they may become fortified by an inflammatory reaction with its material increase of fibrous tissue, which in turn gives additional protection. It is a fact that an area which is not adequately supplied with a free stream of blood can be particularly indolent in healing. This is noticeable in some chancres where phimosis or paraphimosis constitutes a definite mechanical obstruction to drainage. As no syphilitic lesion appears so hard as a typical chancre it might be presumed that a most dense and effective barrier of connective tissue had been formed which certainly must interfere with the free passage of blood and lymph. But the chancre responds most promptly to treatment and its induration is not due to fibrous tissue but to living and growing cells. As the chancre heals, no doubt there is an increase of connective tissue, which may encapsulate the parasite, but it is then extremely probable that both disease and microbes are quite inactive.

We do not seem to have any reason to believe that syphilitic lesions in any part of the body differ fundamentally in their construction and mechanical effects from the chancre; yet in the primary stage the disease can apparently be eradicated, while in the later stages this is rather exceptional. In these stages the characteristic pathological state is apparently only multiplied many times, so that adequate dosage of any potent drug and repeated treatment should eventually eradicate the disease. Further, some degree of immunity, equilibrium, or adjustment should have been attained after the disease has become general. Although the disease appears to be eradicated in the primary stage, yet in some cases the chancre may recur even after many months or years in the same place as before; which would seem to imply that the parasites were still present in the originally diseased area, but had been quite inactive, inactive as dry seeds, and only grew again because they were stimulated to grow by very changed conditions. If such a revivification can occur in one localized area, it is obvious that when the parasites have been distributed over the whole body there are just so many more opportunities for renewed growth. While it is a fact that the parasites are constantly escaping from the chancre to the body at large, it is improbable that they have produced the same degree of reaction and growth, and so, because they have not developed the foundation of an effective barrier, they are accessible to a lethal drug.

This explanation is not entirely convincing, for late recurrences do not repeat the general disease, but in most cases are strictly localized; which seems to imply that some degree of protection or immunity has been secured by the body as a whole. There are, it is true, instances

when the general or secondary stage of the disease is repeated following treatment or even during treatment by arsenical drugs; this, of course, must mean that no immunity whatever has been developed. While there seems some evidence that a form of immunity exists, an immediate objection to such a belief would be that then the offending microbes must necessarily have succumbed, as they could hardly enjoy even a parasitic existence if the tissues were fully protected against them. The canonical view of syphilis seems to be that the spirochætes live, move, and have their being like the moth in clothes or a grub in a log, and resemble rather more closely the latter in their years of unremitting and sluggish toil. Why they should confine their activities to localized areas has not been explained. If any form of immunity has been achieved, for the parasite to survive it will have to enter into some symbiotic arrangement or in turn will have to secure protection or immunity like any other protozoon, and form spores or granules or resistant forms, and, in this latter case, be wholly inactive. However attractive the parasitic or symbiotic idea may appear to be, it hardly explains the localization of the disease in the tertiary stage, nor why the parasite should not be reasonably accessible and succumb to the repeated exhibition of drugs. But such, of course, is the general belief. It does not require any great flight of the imagination to conceive of a resistant phase of the parasite, and there seems reasonable evidence for such a belief; and surely no one who has had to search tediously for these elusive microörganisms in frankly syphilitic sores, and without success, is fully convinced that they are the sole cause of all the manifestations of the disease. Even so, one would be willing to believe that they might curl up like snakes, as they undoubtedly do, and hibernate for a while. Inactive and yet viable microörganisms exist, of which the tubercle bacillus is the outstanding example, though even pyogenic cocci seem to survive in an inactive form for considerable periods in the human body. It is doubtful if they do so in any symbiotic or parasitic manner; they seem rather to be totally inactive and imprisoned in fibrous tissue or to have been ensnared by the growth which their own activities have originated. It may not be too fanciful to attribute to syphilis a similar mechanism.

It is of course obvious that the syphilitic parasite promotes growth, definite enough in any typical chancre, and microscopically evident in the enlarged and growing cells surrounding the vessels — perivascular infiltration as it is called. It is quite within the bounds of probability that once the growth has commenced it promotes further growth by the congestion it may bring about. The infecting agent is disseminated from this area and presumably produces a similar reaction in many places throughout the body to a greater or lesser degree. Glandular enlargements can be seen, and it seems reasonable to believe that the secondary effects in the form of rashes and mucous patches represent a similar growth. The fact that these numerous areas, which would appear to be susceptible to further growth, do not grow, but begin to disappear almost as soon as they have appeared, is common to all exanthematous diseases and has not yet received any satisfactory explanation. In syphilis, as this culmination is reached, the chancre usually disappears, which would seem to indicate that growth has very little to do with immunity, and some special and subtle reaction has to be invoked to terminate the disease.

The difficulty seems to depend on the fact that the human being, in common with most living things of any complexity, has a vascular system, which, developmentally, is a later addition and a complicating, though fortunate, incident to growing tissue. A bud may originate from the duct of a gland and grow away from its source of nourishment and against resistance or the forces in its environment which tend to modify it, and eventually it achieves a final or definitive form and a function, presumably the result of increased resistance and diminishing food supply and stimulating factors. But, accompanying this growth, and apparently lagging somewhat behind, is a new growth of blood vessels, which furnishes more nourishment to these growing cells, and quite possibly complicates or profoundly modifies its function by implementing or completing what has already been sketched out. A function of the blood would be to equalize the forces acting on the various surfaces of a cell, though manifestly such is not always possible. If this is so, the disappearance of the secondary stage of syphilis would apparently be due to an equilibrium; that is the products of the microbes' activity, stimulating factors causing growth, would be equalized or at least balanced on all the effective surfaces of the cells, and this neutralization would enable the tissue to resume its normal form and function. This is a very old idea of immunity, and in its original form does not satisfactorily explain the disappearance of disease nor the protection acquired. In common with all other explanations it ignores the factor of growth. Certainly, local infections do not always cause a general disease; many chancres appear and disappear without any secondary symptoms, and tuberculosis is usually localized.

The most plainly obvious characteristic of infectious granulomata is growth. There is no reason to believe that this is anything but growth, not an infiltration (an objectionable

word) of wandering cells with a high degree of responsibility. Apparently the cells that grow are the endothelial cells of the lymph capillaries, which lose their function as flattened supporting cells and whatever ordered permeability they possess and become growing cells. This is a profound change. In the ordinary course of development in animals some cells will grow and continue to grow until they reach a culmination or achieve a definite function, when they grow no more. This is the destiny of such a tissue, though it would seem more reasonable to believe that it was forced to assume its definitive form and that its destiny was the tradition of its body fluids. It would be improbable if the stimulating or fertilizing agent which initiated the growth were not incorporated, or at least neutralized, in the course of growth. A function such as the permeability of glands on stimulation may be only a mechanism to preserve vitality and a response to the stimulating factor to which the cells are attuned — an ordered allergy.

It is possible that in syphilis we more nearly approach this embryonic state than in those other infections where the intensity of the bacterial growth brings about so much destruction that it frequently exceeds the new growth of the tissue. We would expect, however, that the growth constituting the chancre would after a reasonable period of time bring about its own equilibrium and the new tissue would develop a function which should neutralize the effects of the infecting agent. It is quite probable it does, but the parasites of syphilis are not very destructive, so that the process is prolonged. Moreover, growth in itself is always an embarrassment, which, by interfering with the channels of nourishment, favours one area at the expense of another, or causes an actual destruction of tissue which is to the advantage of the invading microbes. If this view is correct, an infected tissue should always conquer the invader, provided the mechanical effects produced by the reaction or growth are not too severe, exactly in the same way as the skin thickens on a navvy's hand and protects it.

While the parasites of syphilis escape from the original growth and are apparently scattered broadcast they do not seem to develop multiple chancres or secondary growths of any magnitude. This may be because the products of the microbes' activity are increasing and, distributed by the blood, are tending to balance the efforts of the spirochæte on the opposite face of the cell, as it were; the tissues are becoming habituated to the poisons of the disease and growth is less luxuriant.

The endothelial cells of the lymph spaces are the first to respond to syphilitic invasion by growth, but they are only a part of the reticulo-endothelial system and the end-result of a chancre is a scar—an increased production of fibrous tissue. Fibrous tissue seems to be the destiny of this system of cells, probably under conditions of strain, and is a functioning tissue or has developed a function with the cessation of growth. In a limited area the growth caused by an infecting agent would reach its culmination farthest away from the source of stimulation and so enclose the infected area by a ring of fibrous tissue. This would be a perfectly effective immunity; it seems to happen in tuberculosis, though in syphilis it is not recognized. Cells stimulated to grow by some infection seem to have difficulty in reaching their definitive or functioning form, because the microbe is growing as well and keeping up the supply of poisons which modify the surface of the cell and induce growth. There are unquestionably other factors operative in continuing the state of growth, such as dilatation of the blood vessels and a state of congestion, with the result that nourishment may actually be lavish, but oxidative processes slow and the escape of the products of activity delayed, so that the cell or tissue has difficulty in achieving its destiny and form. Many tissues in the human body are peculiarly sensitive to deficiencies in their environment and cannot reach their complete development until these have been supplied. The vitamin which cures rickets and iodine in endemic goitre are outstanding examples. To call them growth factors is wrong; they terminate growth. This is obvious enough in goitre, where the growth is actually diminished in volume, and it is even the case in rickets, where a tissue is formed or brought to completion by the vitamin which forms a basis on which further growth can take place — the usual biological paradox — the termination of growth favouring growth. It would appear, however, that in health as well as disease there may be no absolute deficiency of the factors tending to stop growth or to give a tissue its functional mould, for the factors, infective or even mechanical, promoting or favouring growth may be too potent. It has been suggested that a general infection may cure a disease or at least check its development and allow the tissue to follow its destiny and achieve its function by balancing the stimulating factors acting on the surfaces of the cell. That other body reactions, such as fever or an increased oxidation, may be part of the process and have the same effect is quite probable. In syphilis a number of drugs will arrest the disease, and they are all so extraordinarily effective, although they seem to have no direct effect on the parasite, that they must supply a deficiency, a catalyst or oxidizing agent, which will enable the tissue to stop growing and resume its traditional form. The canonical idea that potassium iodide softens fibrous tissue is not necessary; its effect or the effect of iodine in causing a goitre to revert to normal,

or the action of thyroid extract on myxœdematous tissue, should suggest its method of operation and, far from softening fibrous tissue, it would seem to do the very reverse, form it or bring the growing tissue back to its normal functioning form.

Presumably, reversion to normal follows the subsidence of symptoms; but can there be a reversion to a strict normal, as an immediate process at all events, when there has been growth? The chancre does not usually revert to normal; certainly in most cases there is a permanent scar, and surely there should be no reason to believe that other growths should differ except in degree. It is possible of course that redundant tissue not sharing in any strain, and so not functioning, might be gradually absorbed, but that would take time. We might believe that a general infection by syphilis was followed by innumerable areas of scarring throughout the body, but what reduces such an idea to absurdity is the impossibility of conceiving every perivascular lymph channel to be infected or altered by growth. It seems much more probable that certain areas in various organs, where mechanical conditions are favourable for congestions and delays, where there is some degree of embarrassment of the circulation, that here growth may be more abundant and leave behind it definite scars. This in turn would still further embarrass or weaken the tissue and would be a favourable site for a recurrence. This appears to be more than a belief, rather a fact, for recurrences and sometimes repeated recurrences take place in regions near or even adjoining the scars of old chancres and sometimes actually in the scar. These may be new infections, but such is extremely doubtful. Here the disease has been arrested for months or years; of that there seems little doubt, as the region is so open to inspection that any ulceration, growth or even irritation would have been promptly noted. It is difficult to believe otherwise than that the germs of the disease were totally inactive and that something, some definite change, has been responsible for their growth a second time. These scarred areas mean injured tissue, where the circulation of blood and lymph is defective, so that under certain conditions, possibly irritation of whatever nature, it would be subject to congestions of greater or lesser degree, and the delay in the escape of the normal excretion of the tissue may be just enough to start the growth of the parasite. While the chancre is followed by scarring there seems little proof that other parts of the body will show somewhat similar cicatrices, though of smaller volume. The persistent pigmentation and occasional scarring of secondary rashes of some duration indicates, however, that it can occur. The presumption might be that excessive growth in definite areas was due to the fact that the mechanical conditions in these localities were particularly favourable for the growth of the parasite. Skin rashes apparently occur at the limit of end-arteries, regions of relative stasis, or may be favoured by the peculiarity of the individual and the sluggishness or irregularity of the circulation in his skin; an accompanying disease like scabies would appear to have some effect. Such an idea, however, is not intruded as a pure speculation, but for the deduction which may be made from it, to the effect, that the regions, organs, tissues in which syphilis recurs have always been areas of diminished resistance, and by that fact alone the parasite in the general stage of the disease has been able to bring about an appreciable reaction of growth and subsequent scarring, which further embarrasses the normal function of that tissue and so facilitates a recurrence of the disease. Such might be capable of proof. A further logical deduction would seem to be that the theoretically mechanically perfect individual would not suffer from the disease at all. This individual, however, would have to be a woman; for man is not mechanically perfect, his tissues are too specialized and vulnerable, and his activities are irregular, which probably explains in a mechanical way why he is so much more affected by syphilis.

Still we feel convinced that once the parasites of syphilis have gained an entry they continue to spread until they produce a general reaction; such a reaction is not always plainly evident, inasmuch as it may not produce symptoms, but the changes in the blood detected by the Wassermann and other tests is regarded as an indication of a general response on the part of the body. The lymph glands sometimes seem to respond to the parasites by growth, whereas at other times they seem indifferent. When they are affected they seem to become normal again and presumably are not scarred; for a recurrence in a gland must be a pathological curiosity. One has a vague belief that the parasites and the simple cells of the lymphatic glands, cells growing or ready to grow on the least provocation, find no difficulty in living together in a symbiotic relationship. It is even possible that the parasite may have a predilection for growing cells; but naturally it must first cause sufficient damage to produce the reaction of growth by which it profits. This may explain the extreme infection which frequently occurs in the fetus or new-born infants, and the effects of syphilis on the placenta, the sole organ affected in so many women who give birth to syphilitic infants. A symbiotic relationship between the parasite and the cells of the lymph glands or spleen may be a possibility and would be more readily credible if the parasite were known to have other phases than the spirochæta pallida. In such an event, recurrences might be due to migrating parasites or the cells containing

them settling in localities damaged by accident or disease where they could continue their development and propagate more easily. During the general stage of the disease, in many individuals, the parasites seem to have no difficulty in finding places in which they can grow, and in some few untreated people the disease may persist or continue; it however appears to do so rather as an affection of localities than as a general disease. Obviously the reacting cells of the body have acquired some degree of immunity which they seem to guard very jealously, for tertiary affections appear to be purely local. They would no doubt be regarded as such were it not for the fact that they are usually associated with a positive serological reaction, which suggests a general disease.

It is the fashion to believe that human beings might live forever, were it not for accident and disease, and that organs are superior to machines as they are constantly being renewed and so never wear out or fail to function. The unescapable fact that all animals have an allotted span of life rather contradicts this idea and it is by no means certain that the supporting tissues are regularly renewed. Recurrences in syphilis do occur as the result of injury or at the site of injury and it is reasonable to suppose that age, solidifying tissues, and the strains to which they may be subjected may cause profound mechanical changes and interferences with the blood supply and drainage of certain areas; local disease could have the same effect. This belief of course implies that syphilitic disease, recurrence, such as lesions of the heart or coronary vessels, may not be due to the relentless and continued activities of the spirochæta pallida for many years, but rather to the fact that the individual is getting old and so are his tissues, and here first occurs the break or injury which enables the latent microbes to grow and develop. It has already been suggested that the original infection may have produced scars which have rendered this area one of diminished resistance. It is, however, by no means necessary that the individual should become old before the tertiary or localized lesions appear; if mechanical conditions are favourable they may follow immediately the general or secondary stage and, as people differ profoundly, it would almost seem as if the tissues of some were more succulent, as it were, than others—deficient in some factor which normally hastens or facilitates the cessation of growth and the development of function in a growing tissue. It is probable that nervous tissue is vulnerable, because it is a highly specialized mechanism and easily impaired by some minor change in the blood supply. The mechanical element appears, perhaps, more important than specificity in many diseases; even the original infection in syphilis might be impossible except for an accompanying injury or some favourable stagnant region such as the interior of the uterus or beneath the prepuce.

The Wassermann reaction, or any other test which detects a very definite change in the serum, seems to indicate that the whole organism is responding to the disease; although any clinical manifestation appears to be strictly local. Such, of course, may be a pure assumption, as the peculiar colloidal material in the serum may really represent a secretion from some definite tissue, which has achieved this peculiarity by growth, by incorporating and neutralizing some potent product of the parasite's growth and activity. The products of immunity, or such as can be discovered in the blood, are far in excess of the toxins they neutralize, and surely the most plausible explanation of that increase is by growth, rather than by some strange, illogical, physico-chemical reaction in the serum. If the material causing a Wassermann reaction is a secretion of a very specific nature, it must mean that the individual has suffered from the disease; as otherwise this special secretion would never have been elaborated. We would also presume, that unless these secreting or responding cells were constantly influenced by the poisons or forces which impressed on them their character, they would gradually lose their special structure and revert to their normal form, so that the occurrence of a positive reaction should mean that the disease is present and active or has very recently been active. But a generalized infection may alter very many cells in the body and the reserve of Wassermann-producing bodies may be enormous; further by long continued infection the structure of these particles may have been solidified or rendered much less vulnerable to the solvent action of the blood, if such exists, so that they form an almost permanent part of the serum. There is a possibility that a non-specific stimulus might cause these cells to react, which is suggested by the occasional success of provocative doses of arsenicals, but it is more probable that a syphilitic recurrence in one part of the body, provided its products could escape in sufficient concentration, would cause a reaction of permeability or secretion in those cells already sensitized and an appearance in the blood of those bodies which cause the Wassermann reaction. This obviously is no proof that the disease is general, though it might explain the fact that syphilis can be clinically evident and yet the serological reaction be negative; the poisons do not reach the blood in the necessary concentration to provoke the response or else the cells have lost their peculiar fabrications. The fact that syphilis can be strictly localized and the Wassermann reaction negative disposes of the idea that this test is an index of im-

munity; for the disease is localized and presumably the rest of the body is immune or indifferent. There seems to be some evidence that the bodies in the serum detected by these tests are really produced in response to lipoidal materials within the spirochæte and so may be regarded as a purely adventitious phenomenon; perhaps somewhat illogically, not even a measure of immunity. Now in an original infection by syphilis a period of time must elapse and a fairly general dissemination of the parasite throughout the body before the products causing the Wassermann reaction can be detected in the blood, within the limits of the test. It would therefore appear, if treatment caused both symptoms and the reaction to disappear, that any recurrence of the reaction should be due to an increasing volume of the products from the parasite's growth and activity. Sometimes this undoubtedly happens and the secondary stage of the disease will repeat itself, but there are many occasions when there is no evidence of widespread disease, in fact no evidence of disease at all, and yet the reaction becomes positive; in other cases there may be only a minor lesion. Are we then to believe that a positive Wassermann reaction indicates a general infection in spite of the absence of clinical signs? It hardly seems necessary, for it may be possible that a local lesion might, over a period of time, contribute sufficient materials to the blood to give the reaction, or, what is more probable, that active bodies emanating from some local source might provoke a reaction of secretion or allergy in cells sensitized by similar agents, even many years before. In both these possibilities, a positive Wassermann test would indicate definitely active disease somewhere in the body. There are, however, a great number of cases who show a positive reaction and apparently suffer from no disability, and yet the reaction is quite unaffected by treatment and persists for years. Frequently the reaction disappears following treatment, which may mean no more than that a definite colloidal aggregate occurs in the blood of recent formation and no great solidity and is readily broken up by the introduction of any potent drug. In later stages these bodies may have solidified, so that they persist. It would be interesting to know whether this idea is true, for it would be of material assistance to those treating syphilis. Of course there is one large varying factor, the great difference between individuals; some may react strongly, others feebly, and the products of their reaction, the colloidal particles in the blood, may vary (some may be much more resistant or solid than others). There is also the possibility that the cells whose duty or function it is may have got the habit of forming the products which give the Wassermann reaction and of excreting them into the blood, quite without the intervention of any stimulating or specific agent.

It can probably be said, with very few exceptions, that a positive serological reaction means that a patient has had syphilis, but while we will still have to use this reaction or its absence as a standard of arrest and as an indication for further treatment, we will demand much more investigation of its character before we can be categorical on any other point. It is to the clinician we must look to tell us whether the disease is arrested and not to the blood.

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DIET AND DENTAL CARIES.—Dr. J. Gordon Cameron (Kuala Lumpur) writes: I have been most interested in Mrs. Mellanby's findings on diet in relation to dental caries, and have put them into practice whole-heartedly in my maternity work. Maternity patients here consult me early in pregnancy, and I invariably explain to them the importance of ample vitamins in their diet in relation to their own well-being and the well-being of the child to be. I ask them to take daily doses of a vitamin food prepared by a famous British firm, in which food are present vitamins A, B, and D, the last-named being in the form of irradiated ergosterol. I further ask them to take a small dose of calcium daily, plenty of fresh fruit, and give a few hints about exercise, bowel regulation, and the like. This routine I ask them to carry out from the time at which they first consult me up to the birth of the baby and for several months afterwards. As a result I find that dental caries, almost invariably, does not occur during or after pregnancy; that the mothers to be are exceedingly fit; that at the end of pregnancy they are often healthier than before they became pregnant; that they are, as a rule, able to feed their babies themselves, and that the babies do exceedingly well, both in bone and tooth formation and in general health. As a mere general practitioner, the above practical findings are proof enough for me that Mrs. Mellanby has struck the nail on the head.—In *Brit. M. J.*, 1931, **2**: 1204.

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## READING

### BOOKS ARE YOURS

Within whose silent chambers treasure lies
Preserved from age to age; more precious far
Than that accumulated store of gold
And orient gems, which for a day of need
The Sultan hides deep in ancestral tombs,
These hoards of truth you can unlock at will.

—Wordsworth

# Men and Books

## SANITATION UNDER THE ANCIENT MINOAN CIVILIZATION

BY W. J. CORRIGAN,

*Toronto*

Our present system of sanitation, based on an exact knowledge of scientific engineering, is a thing that we accept as a matter of course. If, however, we look up the history of house and town planning in its relation to drainage and the disposal of sewage we come to the conclusion that it is an outgrowth of barely one hundred years.

A real ministry of health of a nationally wide character was not set up in England until 1919, although the fight for cleanliness and efficient sanitary measures dates back to the pioneer work of Edwin Chadwick during the first half of the Nineteenth Century, and of Sir John Simon who kept up, like a knight of old, the good fight until 1871, at which date only was the national conscience sufficiently aroused to prevent avarice and greed from obstructing many needed reforms. Edwin Chadwick was the first to insist on glazed tile for drainage purposes and Sir John Simon spent a life time fighting for proper sanitary inspection untrammelled by politics. When we consider the last typhoid epidemic in our own city of Montreal, only a few years ago, we may well do honour to a man who had the courage to undertake such a task against ignorance and prejudice.

The Mosaic law laid down strict rules for cleanliness and hygiene, but I have failed to find any definite information that their civilization ever evolved a system of proper sanitation. The ancient city of Rome under the Empire had a system of aqueducts that supplied the inhabitants with drinking water and facilities for bathing, as well as drains, but sanitation as we understand it to-day, was unheard of.

More than two thousand years before Cæsar's legions crossed over to Britain, and when our forebears were living in huts made of wattles and mud, there was a civilization in the island of Crete with houses that were fully equipped with toilets and baths, with tiled drains emptying into deep, well made, underground sewers—all built in a manner that was never again equalled until the Nineteenth Century. This civilization had long been established when "Abraham, the Outlander" left Ur of the Chaldees and marched north and west over the Arabian Desert to get his first sight of the land of Canaan. It was over one thousand years old when the great Pharaoh Tutankhamen was laid in his regal tomb and when Moses was leading the Hebrews through the waters of the Red Sea; its splendour had vanished long before Solomon built his temple in Jerusalem, and was but a myth when Homer the blind Greek singer wrote his Odyssey and Iliad.

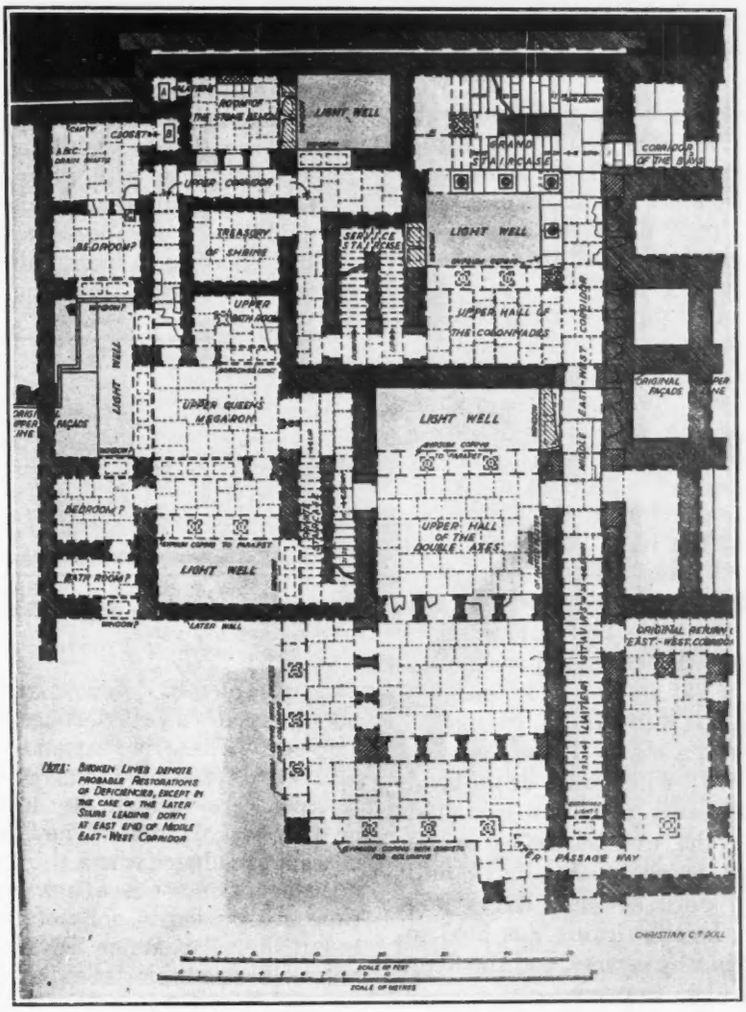



FIG. 1.—Domestic quarters. First floor plan.

How many thousands have read with horror and delight the beautiful mythological story of the Minotaur, of Theseus and Ariadne, and the clue of the terrible labyrinth. We all thought what a fable it was until Sir Arthur Evans, the famous English archæologist, established be-

yond doubt that truth was stranger than fiction. Working steadily since 1900 he has uncovered the ancient city of Cnossos on the north coast of Crete, and has proved that its history antedates the first Egyptian dynasty. In other words, it is the oldest of all the primeval European civilizations, antedated only by that of the Nile valley and the ancient Sumerian civilization of Mesopotamia.

If one cares to read "The Palace of Minos of Knossös" by Sir Arthur Evans he will be astounded to learn that this home of the great priest kings of that period was built almost on a similar plan to our own large palatial hotels. The ground floor of the domestic quarters was 100 by 120 feet, and the great stone staircases were carried up to the fifth storey. Many of the bedrooms had private dressing rooms and private bathrooms, with toilets that were operated as our own with the pan constantly filled with water. The blue print that is published with the text shows five large light wells, many drain shafts, bath rooms, toilets and bedrooms. Indeed, it is hard to believe that we are not studying a blue print of the Twentieth Century. (Fig. 1).

The terra cotta water pipes were beautifully made with collars and stop ridges, and were superior to ours in that the tapering form of each section gave the water a shooting motion well adapted to prevent the accumulation of sediment. The water, which was conducted from the roof and the light areas, was gathered into cisterns and from these conducted down the tiles to the baths and latrines, from which it was again discharged to great stone sewers, many of which were large enough to admit a man. These were connected with huge drain-heads and every provision was made for the excess surface water, just as we to-day have built our storm sewers. Every joint in the tile drains was held together by cement and the floors of the rooms were laid in gypsum.

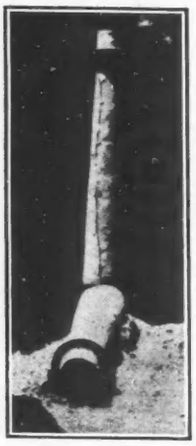


FIG. 2. — Clay water pipes; near area of stone drain-head.

Sir Arthur, in describing one of the latrines, states:— "On the face of the gypsum slab to the right is a groove for a small wooden post for the support of a seat about 57 c.m. above the floor. Outside the doorway of the latrine is a flag, sloped towards a semi-circular hole forming a sink and from this opens a small duct leading to the main drain. The aperture leading to the main drain deviates from the centre of the seat thus leaving room on the right for some vessel for flushing the basin. As an anticipation of scientific methods of sanitation the system of which we have here the record, has been attained by few nations even at the present time."

Captain T. H. M. Clarke, M.B., D.S.O., R.A.M.C., who acted as medical advisor to the High Commissioner in Crete, believes that each latrine had a balance flap to shut off the escape of sewer gas. He also adds that "judging from the shape of the cavity the earthenware basin or receptable for the excreta would have been vertical in front and sloping at the back, or, in other words, it would resemble in shape the washout closet of the present day in which a certain amount of water is kept in the basin by a ridge over which the excreta is carried by a flush of water."

Why, then, may we ask was such a system permitted to go out of use for such a long period —in fact, never to be renewed until within the last century? Two explanations have been offered. The city with its civilization may have perished by a great volcanic eruption or by an earthquake. Some, however, believe that the great barbarian Aryan tribes that came down out of the woods from the north, about 1200

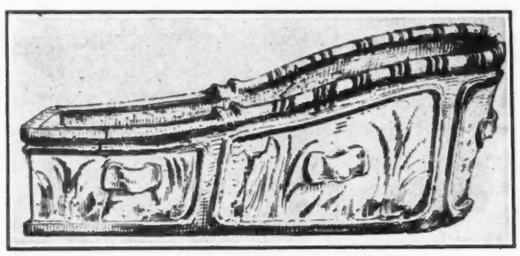


FIG. 3.—Painted clay bath from room adjoining magazine or lily vases.

B.C., completely defeated and destroyed the inhabitants of all the Aegean cities, including Cnossos. These barbarians, whose descendants afterwards founded the great city states of Greece, were without any knowledge of writing or the use of iron. They had never lived in cities and culture was a thing of which they had no conception. Cnossos was laid waste and in time was buried in oblivion, not only figuratively but literally. When Sir Arthur Evans started his excavations it was buried to a depth of twenty-six feet and far beneath that stratum evidence was found of the remains of a Neolithic age. Is there, therefore, anything new under the sun? Tantalus, as some one has aptly said, may have been just as thirsty as the modern American.

I am indebted to the work written by Sir Arthur Evans "The Palace of Minos of Knossos" for all that relates to this ancient system of sanitation.

Dr. A. I. Willinsky, of Toronto, very kindly photographed these reproductions from Volume I of the above work.

# DR. DANIEL ARNOLDI (1774-1849)

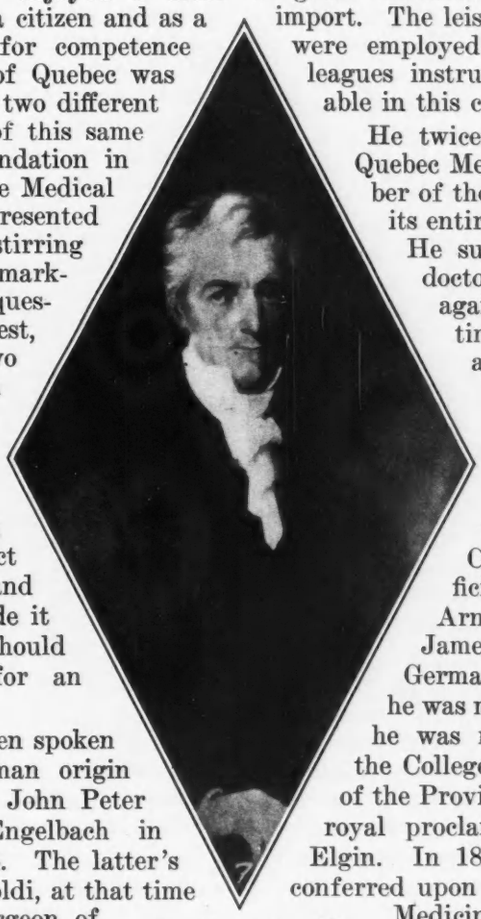
## FIRST PRESIDENT OF THE COLLEGE OF PHYSICIANS AND SURGEONS OF LOWER CANADA (1847-1849)

BY JOSEPH GAUVREAU, M.D.,

*Registrar of the College of Physicians and Surgeons, P.Q.*

*Montreal*

At the time when he was appointed by Lord Elgin as the first president of the College of Physicians and Surgeons of Lower Canada, Dr. Daniel Arnoldi was 74 years of age. He was the dean of medicine and enjoyed a most enviable reputation, both as a citizen and as a surgeon. His examination for competence before the Medical Bureau of Quebec was dated June 22, 1795, and on two different occasions he was president of this same organization. From its foundation in 1839 he was a member of the Medical Board of Montreal and he represented in himself alone the most stirring era of our profession. Remarkably well informed on all questions of professional interest, and a doctor for fifty-two years, he had followed with a vigilant and attentive eye all the current ideas in medicine and all the changes it had undergone. His profound experience, his high sense of honour, and the fact that he spoke both French and English with equal ease made it natural that his confrères should unanimously choose him for an honorary position.



Dr. Daniel Arnoldi

Dr. Daniel Arnoldi has been spoken of as having been of German origin The fact is that his father, John Peter Arnoldi, was born at Engelbach in Germany on March 10, 1734. The latter's father was John Daniel Arnoldi, at that time a prominent citizen and surgeon of Engelbach. John Peter Arnoldi, early in life, found his way to Three Rivers in the Province of Quebec and subsequently married there. His son, Daniel Arnoldi, however, was a Canadian in every sense of the word, having been born in Montreal in 1774.

Dr. Daniel Arnoldi received his secondary education in England and served his clerkship under Doctors Sims and Rowland of Montreal. He practised for some time at Rivière du Loup, then moved to the Bay of Quinté where he led the arduous life of a country doctor, making long snow-shoe trips in winter and canoeing and portaging in summer in order to reach his patients. After five or six years of this toilsome existence, he returned to his native Lower Canada. Having practised for a year at Laprairie, he definitely settled in Montreal and remained there until his death in 1849. He very soon established a practice upon which he could live comfortably, but, although his patients were reliable, his resources were swallowed up in unfortunate speculations. Though he conducted surgery in the manner of that time, he had a gift for devising surgical dressings and splints, and even for making surgical instruments, which were difficult to import. The leisure moments of his last years were employed in fashioning for his colleagues instruments which were unobtainable in this country.

He twice held the presidency of the Quebec Medical Board, and was a member of the Montreal Medical Board for its entire duration from 1839 to 1842. He succeeded Dr. Selby as prison doctor in 1833, and held the post again in 1837 and for quite some time following. A keen Loyalist and very sympathetic towards the French Canadians, he and his son, Dr. F. C. T. Arnoldi, served the Crown without prejudice or passion during this troubled time. Both of them acted at the autopsy on Chenier and drew up the official report. In 1838 Doctor Arnoldi succeeded the Hon. James Gugy as president of the German Society of Montreal—thus he was more than bilingual! In 1847, he was nominated first president of the College of Physicians and Surgeons of the Province of Lower Canada and the royal proclamation was issued by Lord Elgin. In 1848 the University of McGill conferred upon him the degree of Doctor of Medicine *honoris causa*—a laudable custom which could have found no better titulary and which laid proper stress upon the consideration and respect due to an established authority. His death came on July 21, 1849, as a result of the cholera epidemic then ravaging Montreal.

Some of the traits of this noble character might well be considered now. Dr. Arnoldi was a pleasant conversationalist, witty, and with a ready sympathy for everything and everyone. He was extraordinarily kind to young people and the clerks were all devoted to him, seeking his patronage in preference to all others. One of these of whom he spoke very highly, to whom he was always much attached

* Translated by M. J. Warren, Toronto. Illustration loaned by courtesy of Dr. M. E. Abbott (from History of Medicine in the Province of Quebec).

and who returned this attachment was Dr. Andrew Fernando Holmes. Dr. Holmes was among Dr. Arnoldi's first clerks in 1811, and after having qualified at Edinburgh, he returned to practise in Montreal in partnership with his master. He was a member of the committee elected to draw up the Great Charter in 1847, and no one can doubt that it was his hand that held the pen and his mind that conceived the major portion of the plans. His supporter and councillor at all times was his old patron and associate Dr. Daniel, as he was called to distinguish him from his son Dr. F. C. T. Arnoldi, already coming to the fore.

Holmes and Robertson had prepared the way in Montreal for honouring their old friend. Quebec seconded them and Dr. Daniel had only to submit and accept the title which Lord Elgin offered him. This was truly a mature choice and perhaps the only one that could appease the majority of dissenters. It is hard to realize that there were already dissenters at that time. However there were quite a large number of them, recruited for the most part from among the malcontents, the pseudo-professors, the business men of the profession and the whole mass of the rascally exploiters of physic and plasters whom Fisher some fifty years later called "the pests of society". The established Boards had not succeeded in rooting out this objectionable element, but the Charter of 1847 was about to sound their knell. They would not go down without a struggle, however, and chose as their last stand the inauguration of the College of Physicians and Surgeons of Lower Canada, held at the "Palais de Justice" in Montreal, on September 15, 1847.

The Great Charter of 1847 was not voted without very strong opposition, and among the first of this were several well-known Montreal doctors and several English doctors from the Eastern Townships, who had specially organized themselves to oppose it. The preconceived plan had been to refuse to sign the petition demanding the incorporation. However, the only persons who could be considered as members of the College were the petitioners who inscribed their names on the Charter. These alone would have the right to vote for the choice of governors at the inauguration meeting. Nevertheless certain leaders of the opposition were to sign the petition in order to have a determining voice at the general assembly in case the affair should come to anything. The opposition arranged to have some of its partisans sign, while the others refrained, still entertaining the hope that their abstention would prevent the adoption of the Charter. They had deceived themselves, however, for the Charter was adopted by the Legislature, and Daniel Arnoldi, named President by the proclamation of Lord Elgin on the 10th of August, 1847, summoned a general assembly of the signatories of the Charter at the Court House, in Montreal, on the 15th of September, 1847, to proceed with the election of the governors.

It is impossible to ascertain exactly how many doctors took part in that assembly. A single vote was registered giving a result of 47 to 31, which simply meant that the assembly at that time contained 78 doctors qualified to vote. But how many were there who had not the right to vote, and who, despairing of their course, had come to the assembly to obtain it? This we do not know, but it was nevertheless an imposing gathering, well under the domination of its president in spite of the agitation of varied opinions. The chair was taken at a few minutes after ten by Dr. Daniel Arnoldi and Drs. Von Iffland and J. G. Bibaud were nominated secretaries. (From the official report).

This rather unusual coincidence which brought two doctors of German origin to the first assembly of the board of governors as president and secretary, obliges us to introduce to our readers this Von Iffland, who took down all the minutes that day, and who was besides an interesting type, although up to now we have been careful not to make secondary personages conspicuous. As for Bibaud, we know already that he was one of the pillars of the School of Medicine and Surgery. He owed his nomination as secretary to the respect of the majority and was besides elected a governor. Von Iffland was elected on account of the need for constant action and no doubt he was content. Neither one was permanently elected secretary. It was Dr. David who annexed the secretariat, one month later, at the general assembly in Quebec. Von Iffland, like Arnoldi, was a Canadian by birth. He had a German father, but his mother was French. He was born in Quebec and there began his study of medicine. Later he went to Paris and then to Edinburgh to complete his education. In 1820 he practised in Quebec where he established the first dispensary. The public lectures which he gave on anatomy threw a bad light on his reputation for dead men's bones and did not appeal to his audiences. He left the city and established himself at Sorel where the Governor had his summer residence. By discreet conduct Von Iffland came to the notice of influential people and became all at once physician, magistrate, health officer, census commissioner and military surgeon. In 1832, once more in Quebec, he devoted himself to the cholera victims. Having tried, without success, to have himself elected member of parliament for Gaspé, he was nominated doctor at the Naval Hospital in 1836. In 1839 he tried his fortunes at St. Michel d'Yamaska. In 1847 we find him at Beauport near Quebec. These various peregrinations had caused him to be considered inconsistent and he failed to be elected governor. He was the seventeenth on the list, and the

number required was fifteen. He was appointed in 1849 with Wolfred Nelson to a governmental commission which was to enquire into the conditions in hospitals and asylums and his report was greatly appreciated. In 1852 he became assistant physician at Grosse Isle, and later, when Douglass died, he became superintendent. During the last years of his life he was commissioner of the Naval Hospital and died in 1876. His patients called him "le docteur Va Renifler". A man of extraordinary intelligence, very ambitious, absolutely honest, highly cultivated, he held positions of trust all his life. He knew how to impress the assembly of 1847 and was unanimously chosen.

Von Iffland read the Act of Incorporation, the proclamation of Lord Elgin naming Dr. Arnoldi as president, then Dr. Arnoldi's proclamation summoning the signatories of the Charter to the general assembly, as they were the only actual members of the College who had a deliberating voice and the right to vote. Then was read a rectification of certain petitioners' names, which had been poorly written or omitted in the Charter. This was addressed to the president by the Attorney-General of the province—Mr. Badgley.

Dr. Coderre, of Montreal, seconded by Dr. Joseph Painchaud, proposed the following:—

> That all the doctors present at this assembly who had not yet signed the Petition presented to the Legislature be elected members of this College before this assembly proceeds with its deliberations, and that they sign as members.

This was the great return move which would probably have changed the aspect of our first governorship had it come to anything. There followed a long and violent debate, after which the president adjourned the meeting for two hours "for the sole purpose of learning the opinion of the Attorney-General upon the legality of immediately conferring the rights and privileges of the College of Physicians upon all those whom he mentioned in his letter". This is all that is mentioned in the minutes, but one may imagine that the president adjourned the debate, asking the general assembly to permit him to decide the preliminary question concerning which he had serious doubts, before they continued the discussion. Here he displayed consummate tact. Two hours intermission and an excellent dinner would do much to soothe the ardent spirits. Arnoldi knew this well and he foresaw the reply of the Attorney-General.

At two o'clock the Attorney-general's answer was read to the assembly. It was thus drawn up:—

> The opinion of the Attorney-general on the question submitted, which was read to the meeting, has the effect of denying the right to membership in the College to any but those already referred to in his former letter.

There was no resumption of the discussion for the rest of the day. Dr. Painchaud, supported by Dr. Roy, presented a list of 36 names for governors, in the hope of having them all elected by acclamation. Dr. Hall in amendment, supported by Dr. Marsden, proposed a secret ballot. This was the only vote which was registered. There were 47 for the amendment and 31 against it. Drs. Brady and Deschambault were named as scrutineers. At half past seven the governors who had been elected were announced. Drs. Hall, Campbell, Tavernier, Sutherland and Charlebois, of the district of Montreal, had received the same number of votes—36. Only four governors were necessary to form the required total. Called upon to give his casting vote, the president explained that, as he had learned that Dr. Charlebois wished to resign in the event of such a case as the one in hand, he would give his vote in favour of Hall, Campbell, Tavernier and Sutherland. Here is the complete result of the first election:

> *District of Quebec.*—Drs. P. M. Bardy, Jean Blanchet, J. B. Blais, James Douglass, M. P. De Sales Laterrière, Charles Fremont, J. B. Landry, Joseph Morrin, A. T. Michaud, J. Z. Nault, J. B. Noel, Joseph Painchaud, Sr., John Roy, Oliver Robitaille, J. A. Sewell. This was the entire school of medicine in Quebec!
>
> *District of Montreal.*—Drs. F. C. T. Arnoldi, Francis Badgley, J. G. Bilaud, Thomas Boutheller, A. H. David, A. F. Holmes, Archibald Hall, Thomas Kimber, J. B. LeBourdais, Michel McCulloch, Wolfred Nelson, Wm. Sutherland, Louis F. Tavernier, M. F. Valois, G. W. Campbell. This was the entire Montreal Medical Board!
>
> *District of Trois Rivières* and *St. Francis.*—Drs. G. Bedaud, P. Brassard, Thomas Fortier, W. A. R. Gilmour, Wm. Marsden, A. Mailhot.

We have long searched for an authorized opinion of this assembly and owe it to the kindness of the grandson of "Dr. Daniel", Mr. Frank Arnoldi, K.C., of Toronto, who communicated with us upon the subject. The result is an extract from a biographical sketch which was read at the General Assembly of the Governors held at Trois Rivières in 1850, the first general assembly after Dr. Daniel's death. This was published in pamphlet form by Wm. Salter and Company, Montreal, in 1850. It is a type-written copy which we possess, but is certified as conforming to the text by Mr. Frank Arnoldi, K.C. This is what the author of this pamphlet says:

> The delegation of political powers to any set of men has always been a matter of difficulty, both in theory and practice. This remark, unquestionably true in the science of political government, is nevertheless equally true and applicable to medical politics or the politics of medical men,—who have alternately held the two extremes of conduct, of utter apathy as to their rights and privileges or of an over-weening watchfulness, equally unwise. The worst result coming from this, independently of the inevitable disappointment was the mutual jealousy, if not temporary animosity which it engendered—a state which was at its climax at the first

meeting of the members of the College in July, 1847, and over which Dr. Arnoldi presided. It is not our intention to pass our judgment on the transactions of that day; they resulted in a ballot which placed in the position of Governors the gentlemen who since that day so frequently and so amicably met together, but we must be allowed to give it as our opinion that to the moderate yet energetic, firm, yet conciliatory, conduct of the President, we owe, at this day, our existence as a well established and useful association of men. For this alone, Dr. Arnoldi's memory should by all who have an earnest and sincere desire for the welfare of the profession be revered. And who can foresee to what an extent our professional standing may be elevated by a systematic cooperation among educated men, who, laying aside selfish and narrow considerations, bring their opinions, their information, their experience into one common stock, and so render their results accessible and available to all. Or, if we do not produce any such great effect on the rising generation of young medical men, is it not something for which to be profoundly thankful, to be aware that the social qualities of men thus placed have not been left barren and desolate?—to feel that the more such benevolent impulses are cultivated the more will they diffuse their happy influences among us. These struggles now ended, buried, should not be our munitions of war; let there be a contest yet, however —one of generous emulation, a competition of minds untrammelled, rational, educated men, and the triumph, on whichever side fortune smiles, will be for both, untarnished by any stain. Of such advantages, of such pleasurable reflections, the action of the day to which allusion has already been made, has been the origin. Can we do otherwise than gratefully remember him who successfully brought it to an issue?''

The tribute of homage which we have just rendered to the first president of the College of Physicians and Surgeons of our province is humble and rather tardy. Nevertheless we are particularly happy to have been able to mark out this grand figure of the medical profession for the veneration of the masses, who are more or less informed upon the facts of the story. It is meet to honour personages such as he. From his life a lesson may be drawn.

Daniel Arnoldi remains for ever the best type of medical men who owe everything to themselves. The only advantage he had over others was his secondary education, which had been carefully supervised. Apart from this, he had never attended the university nor the medical school, for there was none in our country at that time. No doubt he had many excellent patrons, but in his case as in that of others, the patron did not make the doctor. His love of study soon covered any lack and his powers of observation did the rest. All his life he practised his profession scientifically, devotedly and lovingly, nor did he shirk his social duties. He served his country and his king, and earned the esteem of his fellow citizens. His confrères, both graduates and university professors, remained loyal to him to the end. Highly proficient in his profession, he asserted himself upon all occasions as a man of character. Above all he was endowed with an exquisite tact which permitted him, while remaining true to his own convictions, to be the friend of those whose opinions he did not share. The natural qualities which he possessed are not the lot of everyone and it is true that nothing can be given to him who has nothing—but what a man to emulate and to follow! His contemporaries respected and honoured him—let us imitate him!

# Hospital Service Department Notes

## A SUBSCRIBER SYSTEM ADOPTED BY THE WINDERMERE DISTRICT

The idea of voluntary subscription to an insurance arrangement to provide hospital and perhaps medical benefits has been in operation in some Canadian communities for several decades, and has, apparently, proved satisfactory to all concerned. Perhaps the more general expansion of the "hospital subscriber" plan of support, by spreading the cost of sickness and lessening the burden when the blow descends, would go a long way to lessen the demands of an ever-increasing section of the public for a radical change in our system of medicine.

The most recent hospital to appeal to the community for insurance subscribers is the Windermere District Hospital at Invermere, B.C. Located on the Columbia River and overlooking beautiful Lake Windermere, this little hospital and the local doctor, Dr. F. E. Coy, care for a long stretch of mountain-flanked valley, a scattered district reaching eighty miles to the north to Golden and the same distance south to Cranbrook. The basis of offer embodies several alternatives. For one dollar a month an individual may have free hospital and medical care; for one and one-half dollars this protection is given to a married couple; for two dollars per month a family ticket is issued covering man and wife and all children under sixteen years of age. Medicines are supplied and the doctor's charges are covered for treatment up to a total of sixty days in any one year. Illness or injury resulting from alcoholism or venereal diseases are not included, nor are maternity cases nor infectious diseases. To facilitate payment, permits are available authorizing the local bank to deduct the monthly subscription from the subscriber's account.

No hospital (or doctor) makes a fortune on this arrangement, but, barring epidemics or other unusual calls upon the services provided,

**All communications intended for the Department of Hospital Service of the Canadian Medical Association should be addressed to Dr. Harvey Agnew, Secretary, 184 College Street, Toronto.**

a reasonably steady revenue to meet fixed overhead is assured, for it has been noted in mining centres and elsewhere where the system has been in operation for some time that, even in times of the most widespread unemployment, the subscribers make every possible effort to keep up their dues.

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## THE PAYMENT OF VISITING MEDICAL STAFFS

Doctors in Canada will be much interested in the recent report on this important subject made by the joint committee of the British Medical Association and the British Hospitals Association. Payment of the visiting medical staffs of Voluntary Hospitals was under consideration. This study was undertaken because the increasing substitution of institutional for home treatment, and the narrowing of the field of private practice in the case of consultants and specialists has reduced the number of such doctors who are in a position to give gratuitous service to the hospitals. The need for payment has been emphasized by the fact that the Public Authority Hospitals may have both full-time and paid part-time medical officers and that patients enter the Voluntary Hospitals who could afford to pay their medical attendants.

The Report, which was signed by Mr. N. Bishop Harman, Dr. Alfred Cox and others well known in Canada, concludes "that the time has come to recognize the claim of the visiting Medical Staffs to some share in the moneys raised for the treatment of patients in Hospital . . .". It is further recommended that contributory schemes be instituted wherever such schemes are not already in existence and the opinion is recorded that the ideal contributory scheme is one in which the individual contributor shall contribute upon a basis which provides not only for the cost of hospital maintenance but which provides also for the remuneration of the visiting medical staffs. The Joint Committee recommends also that provision be made in all suitable hospitals of a sufficient number of rooms or wards for paying patients, coupled with the strict application of a maximum means test for entry into general wards.

This question of remuneration for public ward service has been raised many times in Canada but, apparently, there is as yet no crystallization of opinion. The public has no conception of the amount of free work done by the profession in hospitals alone. Recently it was estimated that the public ward and out-patient services rendered by the doctors in one Canadian city, if paid for at nominal rates, would amount to nearly two million dollars annually! Those who favour continued free service as in the past are of the opinion that this gratuitous service marks perhaps better than any other attribute the high and altruistic calling of the physician; that those who do ward service are compensated by the experience gained and that most consultants and specialists are such largely by virtue of years of this ward service. Moreover it is pointed out that the present arrangement is excellent for the patients themselves, as it ensures for them attendance by doctors who are generous in their nature and scientific in their methods. If payment were made, it is feared that other factors than a love of mankind or a desire for scientific knowledge would lead other members of the profession to use every influence to gain those positions.

However there are many who feel that there is a limit to impositions on the profession and that they all do more than their share of free service in their private practices. With remuneration, more time and consideration would be given to ward rounds by the visiting staffs. At present many of the best men in the community cannot afford to give their time to ward or out-patient work, or, if still on active ward service, tend to delegate this work to juniors. Moreover the experience gained on many public wards, especially in smaller hospitals, may not be particularly valuable and, in smaller communities especially, is often not given consultant recognition by one's colleagues. Perhaps the crux of the matter lies in the problem, Where can the funds for payment be obtained? This seems to be the serious problem in the British situation and bids fair to render nugatory our discussions in Canada for some time to come.

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## POST-GRADUATE COURSE ON HOSPITAL TECHNIQUE

The International Hospital Association announces a course on hospital technique to be given in Frankfort-a.M. in September and October of this year. This is the first international course ever given and it is hoped that the experiment will be successful. The course is from September 29th to October 8th, for which a fee of 30 marks is charged. Lectures and demonstrations are given by outstanding hospital and medical authorities. The subjects covered are x-ray and radium in hospital, physiotherapy, feeding of patients and food transportation, errors in hospital construction, nursing problems, hospital lighting, ventilation and sterilization, the preventive function of the hospital and various administrative problems. Much of the instruction will be in English. Applications for enrolment should be sent to Geheimrat Dr. Alter, 5 Moorenstrasse, Düsseldorff, Germany, or to our Department of Hospital Service.

# Provincial Association Notes

## THE ALBERTA MEDICAL ASSOCIATION

The annual meeting of the Alberta Medical Association will be held in Edmonton this year on September 20th, 21st and 22nd, under the presidency of Dr. T. W. E. Henry, of Fort Saskatchewan. This meeting gives promise of being one of the most interesting in the history of the Association, since the following representatives of the Canadian Medical Association have signified their intention of being present: Professors Gallie and Hendry, of Toronto University, Professors Hall and Miller, of Western University, and Dr. T. C. Routley, General Secretary of the Canadian Medical Association. The last meeting of the Provincial Association was held in Edmonton in 1928.

## BRITISH COLUMBIA MEDICAL ASSOCIATION

At the annual meeting of the British Columbia Medical Association, held in Kelowna, Dr. W. J. Knox, of Kelowna, was elected *President;* Dr. G. S. Purvis, of New Westminster, *Vice-president* and Dr. D. E. H. Cleveland, of Vancouver, *Sec.-Treasurer.* New members of the executive are Drs. W. G. Bisset, of Duncan; J. H. Hamilton, of Revelstoke; and F. W. Auld, of Nelson. Dr. W. S. Turnbull, of Vancouver, is *President-elect* for next year. Features of the meeting were addresses by Dr. A. Gibson, of Winnipeg and Dr. E. L. Pope, of Edmonton. Social activities included golf, motor and boat trips, ending with a ball.

The annual meeting of District No. 6, of the British Columbia Medical Association, which comprises the greater part of Vancouver Island, with the exception of Victoria, was held on June 1st. Dr. E. R .Hicks, of Cumberland, was elected *President;* Dr. D. P. Hanington, of Ladysmith, *Vice-president,* and Dr. A. B. Manson, of Nanaimo, *Sec.-Treasurer.*

**CANADA CAN CLAIM LEADERSHIP**

In aerial surveys.
In national parks.
In deep-sea fisheries.
In wheat championships.
In electrical development.
In world's largest dry docks.
In railway mileage per capita.
In world's largest buffalo herds.
In per capita generation of power.
In highest grade wheat standards.
In the Empire's largest flour mills.
In Empire's life insurance per capita.
In some of the world's greatest bridges.
In world's largest pulpwood resources.
In the Empire's largest forest reserves.
In deepest undersea coal mine (3 miles).
In the world's largest National Exhibition.
In the largest inland sea-port, at Montreal.

# Medical Societies

## THE BORDER MEDICAL SOCIETY

A meeting of the Border Medical Society, which comprises southwestern Manitoba, southeastern Saskatchewan and northern part of North Dakota, was held at San Haven Sanatorium, Dunseith, N.D., on May 26th. The medical staff of the sanatorium presented cases and x-ray films, Dr. D. A. Stewart, Superintendent of Manitoba Sanatorium, Ninette, gave an address on "Tuberculosis to-day", and Dr. French, Dean of the North Dakota Medical College spoke on tuberculosis. Dr. Cyril Glaspel, of Grafton, N.D., led the discussion.

## THE EDMONTON ACADEMY OF MEDICINE

The May meeting of the Academy was held on May 4th at the Medical Building. The speaker for the meeting was Dr. Merritt, of the Calgary Medical Society, his subject being "Hypertension", which was presented in a very clear and concise manner.

The speaker emphasized the fact that taking the blood pressure should form a part of every physical examination. He further stated that as blood pressure is affected by emotional disturbances it is not constant and one reading should not be regarded as sufficient. The patient's history should be investigated and in every suspicious case a kidney function test should be done.

Hypertension is of the following types:—

1. Hypertension of aortic regurgitation. In this case a high blood pressure is necessary for compensation.
2. Renal type, in reality, interstitial nephritis.
3. Psychic type, an example of which is hypertension of the menopause, due to adjustment of the individual to new conditions.
4. Essential hypertension, in which all cases have some renal involvement and three phases enter into the picture, *i.e.,* cardiac, cerebral and renal, the symptoms depending in each particular phrase or group of phrases predominating.

Regarding the treatment of hypertension Dr. Merritt said it was important that the patient should not be allowed to believe himself an invalid, and that living in moderation should be the key note of treatment. In the discussion following, Dr. Claude Jamieson spoke on "Hypertension in relation to the eye." Drs. Irving Bell, Redmond, J. W. Scott, and Heber Jamieson spoke on various features regarding this condition, each speaker warmly congratulating Dr. Merritt on his excellent handling of the subject.

T. H. WHITELAW

### THE HURON COUNTY MEDICAL SOCIETY

The first regular meeting of the Huron County Medical Society for 1932 was held in the Alexandria Hospital, Goderich, the new President, Dr. A. H. Macklin, presiding. Dr. A. A. Fletcher, of Toronto, addressed the Society on chronic arthritis. Miss Winter, R.N., of the Victorian Order, demonstrated their methods of working in a private home. Dr. A. Moir of Hensall spoke on the limitations in the "Use of radium," and Dr. H. A. Vokes gave an outline of the treatment of chronic osteomyelitis by the use of maggots of the blow-fly.

### THE OTTAWA CHIRURGICAL SOCIETY

A special meeting of the Ottawa Chirurgical Society was held on May 17th to demonstrate the methods of diagnosis and treatment of cancer carried out by the Ottawa Civic Hospital cancer unit. The Provincial Minister of Health and the Federal Minister of Pensions and National Health were present.

### THE WINNIPEG MEDICAL SOCIETY

The annual meeting of the Winnipeg Medical Society was held on May 20th. The following officers were elected for the season, 1932-1933: *President,* Dr. F. J. Hart; *Vice-president,* Dr. W. W. Musgrove; *Honorary Secretary,* Dr. O. C. Trainor; *Honorary Treasurer,* Dr. O. J. Day; *Trustee*—3 years, Dr. A. P. Mackinnon.

## University Notes

### University of Alberta

At the request of the Alberta Medical Association, the Faculty of Medicine conducted during the month of May a short clinical course of five days' duration in the University Hospital. More than seventy physicians practising in the province were in attendance. Twenty-six of these took advantage of the privilege of board and residence in the University and were thus conveniently housed within a few minutes of the hospital. The hospital arrangements were very good, the clinical material was interesting, and the course was pronounced useful and a success. This represents the modest beginning of post-graduate medical teaching in the University of Alberta, which, it is most pleasing to note, is undertaken at the request of the profession. The College of Physicians and Surgeons of Alberta bore some of the moderate expense, and looked after the necessary information publicity to the profession. There was no fee for the course. The following members of the Faculty took part: Drs. W. S. Armstrong, J. O. Baker, I. R. Bell, L. C. Conn, A. Day, J. K. Fife, W. F. Gillespie, R. G. Huckell, C. V. Jamieson, H. C. Jamieson, D. B. Leitch, M. R. Levey, J. A. McPherson, H. H. Mewburn, A. R. Munroe, H. Orr, J. L. Petitclerc, E. L. Pope, J. W. Scott, W. H. Scott, R. M. Shaw, E. C. Smith, W. A. Wilson, J. G. Young and R. T. Washburn, Superintendent of the University Hospital, in charge of the very satisfactory hospital arrangements.

Economic conditions possibly accounted for the considerable attendance, about one-tenth of the physicians in the province, as, no doubt, the majority of the profession are financially unable to move far afield this year for post-graduate work. Nevertheless, there would seem to be a definite demand for such teaching within the province and the course is to be continued and will be elaborated and extended.

The Board of Governors of the University, the University of Alberta Hospital Board, the President of the University and the instructors, etc., received the courteous thanks of the profession, as expressed by the President of the Alberta Medical Association, Dr. T. W. E. Henry, of Fort Saskatchewan, on the final day of the course.

### Dalhousie University

At the recent examinations at Dalhousie University for the degree of M.D., C.M., all the candidates were successful, and were awarded their degrees at a Convocation held on May 10, 1932. This occasion was notable for two reasons, for it marked the first Convocation at which Dalhousie's fifth President, Carleton Stanley, presided, and the last appearance, as Dean of the Medical Faculty, of Dr. John Stewart. Dr. Stewart received a great ovation on rising to present the candidates for their degrees. In spite of his eighty-five years, he still takes an active interest in the affairs of the Medical School. Dr. Stewart carries with him the deepest respect and even affection of the graduates and staff of the Dalhousie Medical School to which he has given such yeoman and devoted service for a long period of years. His character and ability have been absorbed into the very being of the School.

### McGill University

Announcement of a grant of $1,232,652 by the Rockefeller Foundation of America to McGill University for the establishment of a neurological institute in Montreal was made recently. The institute will be under the direction of Dr. Wilder Penfield who is now head of the department of neurology and neurosurgery at McGill University and neurosurgeon at the Royal Victoria and Montreal General Hospitals.

The proposed site for the new institute is just north of the Pathological Building on University Street, across from the Royal Victoria Hospital. The building will be four or five storeys high and have a total floor space of about 18,000 square feet. It will be connected with the Royal Victoria Hospital by an existing tunnel under University Street to the Pathological Building, and also by a covered overhead passage. It is proposed to start construction of the building this summer. The significance to McGill University, and to Montreal and the province, of the successful conclusion of negotiations extending over two years with the Rockefeller Foundation is pointed out in a brief statement by Principal Sir Arthur Currie.

"This ensures the successful conclusion of a project," Sir Arthur stated, "which means much to the advancement of medical science, medical teaching and medical research. It will bring comfort and hope to thousands of sufferers from nervous diseases and brain disorders.

"It means that we shall have in Montreal one of the best-equipped, best-staffed and best-arranged institutions in the world where the sick receive the best possible care, attention and treatment, where the medical students will have the best training available, where practising physicians and surgeons can bring their knowledge up to date in an ever widening field.

"It will bring to Montreal patients and students from everywhere and add materially to the reputation of our city and province as a centre of scientific progress. To our medical schools and hospitals it gives added prestige, reputation and opportunity for scientific effort.

"No better evidence could be given of the international attitude of the Rockefeller Foundation who have made such a wonderful contribution to the happiness and welfare of humanity."

The treatment of nervous diseases at McGill University and in Montreal hospitals has received great impetus in the past ten years. About ten years ago the University appointed two clinical professors in the department of neurology which was then a sub-department of medicine, these two being Dr. Colin Russel of the Royal Victoria and Dr. F. H. MacKay of the Montreal General Hospital staff.

Another milestone in the history of the department was reached five years ago when Dr. E. W. Archibald, Professor of Surgery, undertook to build up the department. He combed Great Britain and the United States for an outstanding brain surgeon and it was decided to invite Dr. Wilder Penfield, Associate Professor of Surgery at Columbia University and surgeon of the Presbyterian Hospital, New York City. The deeper interest in the work here was shown by the Foundation when the director of its medical services, Dr. Gregg, visited Montreal, devoting much time to inspecting the opportunities here and the personnel of the medical faculty. Further negotiations followed and the Foundation finally chose Montreal as the location for the institute, on the willingness of Dr. Penfield to remain here.

The project has been so well received by the municipal and provincial authorities to whom it has been submitted, and their assurance of cooperation in the further development of Montreal's hospital and scientific facilities has been so ready as to constitute a vital factor in the favourable decision of the Rockefeller Foundation. Individual friends of the university and members of the board pledged $150,000 while others have promised their support.

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Announcement of the selection of Dr. Thomas Wright Moir Cameron, of Edinburgh University, to head the new helminthology institute at Macdonald College has been made by Principal Sir Arthur Currie at McGill. Dr. Cameron, a recognized authority on parasitology, in addition to being director of the institute, will be Research Professor of Helminthology.

The new director of the institute at Macdonald College is a native of Glasgow, where he was born in 1894. He received his early education at Allan Glen's School, graduating from Glasgow University, Edinburgh, London, and the Royal Veterinary College. He has written some 60 papers on agricultural parasites and allied topics. From 1923 to 1929 he was connected with the London School of Hygiene and Tropical Medicine and the Institute of Agricultural Parasitology. From 1929 he has been connected with Edinburgh University as Lecturer in Helminthology, conducting work as well at the Royal Veterinary College.

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Colleagues of Dr. H. S. Birkett, for 44 years a member of the teaching staff at McGill University, honoured him at a dinner held on May 26th in the Faculty Club, McGill, on the occasion of his retirement from the university and the Royal Victoria Hospital.

Dr. Birkett graduated in Medicine from McGill in 1886. He was an interne at the Montreal General Hospital the following year and then spent two and a half years studying abroad. In 1890 he was appointed laryngologist at the Montreal General Hospital, resigning in 1899 to become oto-laryngologist at the Royal Victoria Hospital.

His connection with McGill dates back to 1887 when he was appointed a demonstrator in anatomy. He attained full professorship in laryngology in 1894 and was appointed professor of oto-laryngology in 1906. During the war he was in command of No. 3 Canadian General Hospital (McGill). For his war services, which were of a distinguished character, he was awarded the C.B., and promoted Brigadier-General. He was one of the Aides-

de-Camp of Lord Byng when Governor-General of Canada.

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The medical faculty is sending an exhibit illustrating congenital cardiac diseases to the centenary meeting in London, England, of the British Medical Association. The exhibit, arranged under the direction of Dr. Maude E. Abbott, Assistant Professor of Medical Research and curator of the medical museum, is described as the most complete exposition of congenital heart conditions that has ever been collected. The material has been exhibited in the United States but has now been rearranged and amplified for shipment to London.

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### University of Toronto

Nearly 150 candidates graduated in medicine at the University this year. The following are the honour awards.

Gold medal, C. Aberhart; silver medal, K. F. Brandon; silver medal, J. K. W. Ferguson, M.A.; The Ellen Mickle Fellowship, T. H. Hodgson, M.A.; The Chappell Prize (in medicine), C. Aberhart; The David Dunlap Scholarship, J. C. Richardson; The Ontario Medical Association Prize in Preventive Medicine, K. F. Brandon; The James H. Richardson Fellowship in Anatomy, M. Appel.

*Undergraduate.*—The David Dunlap Scholarship, *Fifth Year*, W. J. Hendry, B.A.; *Third Year*, Miss M. E. Cunningham; The Baptie Scholarship, H. V. Rice; The Robert Bruce Bursary, Miss J. A. McGeachy.

*Graduate.*—The Reeve Prize, J. L. McCollum, M.D., B.Sc. (Med.); The Starr Gold Medal, G. L. Duff, Ph.D., M.D.

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## Special Correspondence

### *The London Letter*

*(From our own correspondent)*

Sir James Berry, in the Annual Oration before the Medical Society of London, recently dropped a mild sort of bomb about appendicitis. He revealed that King Edward VII had not had his appendix removed at the operation, which did not take place until the tenth day after the first symptoms, and yet this very operation has been in part responsible for the cult of early, and, he rather hinted, unnecessary, removal of the appendix in many thousands of patients. Sir James also quoted figures to show how patients admitted to St. Bartholomew's Hospital in the early days when he was a house-surgeon, with perityphilitis, all bad cases with considerable swelling in the iliac fossa, mostly recovered completely, and this, he said, was confirmed by the experience of many practitioners up and down the country who treat appendicitis by bed, starvation and avoidance of all purgatives and enemata. Subsequent correspondence in the medical press has shown that the truth is not altogether to be found in Sir James Berry's remarks, because appendicitis may be inflammatory or obstructive and the latter type may very quickly go on to gangrene and perforation if operation is not performed early. Nevertheless, the reviving of this old controversy is probably opportune, as we are in considerable danger at the present time of excessive surgery. Mr. T. B. Layton, in a recent admirable pamphlet, has called attention to the danger of too many operations for the removal of tonsils and adenoids, and a recent discussion at another London Medical Society on the subject revealed that many thoughtful physicians are agreed that too much surgery is being done. At this latter discussion it was emphasized that drastic surgery may be worse than the disease and one speaker condemned the all-to-frequent operation for adhesions, for stitching up various abdominal organs, and for operations on the gall-bladder which quite failed to relieve symptoms. It may be, as one physician suggested, surgeons are lured into excessive surgery by the physicians themselves, but altogether the sense of the meeting seemed to be that too much surgery was being done. It is a healthy sign when criticism springs up within the offending body, but the public must be rather mystified as to what to do. The answer is, as always, to find a good practitioner and be guided by him.

The problem of the proper way of using radium for the treatment of malignant disease continues to cause considerable discussion. The Radium Commission decided earlier this year to convert the "bomb" of four grm. into smaller units and this caused several experts, including one of the surgeons at the hospital where the bomb was in use, to write a very strong letter to *The Times* condemning this action. As a result of this emphatic criticism a conference was called, presided over by Lord Dawson, and an account of the proceedings at the conference and the conclusions reached has recently been issued. It seems that the discontinuance of the use of the radium bomb was based upon other than scientific considerations, and that until we have an adequately staffed radium institute, comparable to those in Sweden, France, Belgium, etc., the bomb cannot be used to best advantage. The conference resolved that such an institute was urgently necessary and in the meantime suggested the setting up of a special committee to investigate the case for mass radiation by radium, its advantages and dangers, and especially how it compares with those attendant upon the use of radium needles and radon seeds. The committee is to hold its proceedings in private and report to the con-

ference. The names of the committee are a sufficient guarantee that it will do its work well, but the reasons for privacy seem difficult to understand. At any rate, we may soon expect a satisfactory lead on the matter of radium therapy and be spared the discussion of scientific and technical troubles in the public press.

Crime is still not sufficiently regarded as a matter for medical consideration, and yet many years ago Samuel Butler described in "Erewhon" hospitals for the criminal and prisons for the sick. This is, perhaps, an extreme view, but there is much to be said for regarding the criminal mind as a mind diseased. It is especially important nowadays that this aspect be kept in mind, for crime is on the increase and the statistics for 1930, recently issued, make gloomy reading. There has been a decrease in murder, but an increase in crime against property, especially in those areas where industrial depression is at its worst, and blackmail and bigamy are on the upgrade. Recent events in some of our best known prisons have stirred public attention and the riot at Dartmoor seemed to indicate that all was not well in our prison system. If this is to be remodelled on lines based on modern psychology the medical profession must surely be consulted. The practitioner in his work touches very often on the fringe of the world of crime, and some of the best detective authors have been doctors. There must be some significance in this and the profession ought to show a practical interest in dealing with our increasing criminal population, which is, sad to say, largely juvenile.

ALAN MONCRIEFF

London.

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## *The Edinburgh Letter*

*(From our own correspondent)*

The City of Edinburgh is to appear in the rôle of a pioneer in assisting students in their university careers. The Education Committee of Edinburgh Town Council have approved a scheme of loans to facilitate the attendance of students at the University. Atfer a review of their financial circumstances and proof of their qualifications for entrance to the University, loans may be granted to intending students. The loans amount to a maximum of £25 a year in each case. All beneficiaries must be resident in Edinburgh, and on receiving the loan, must sign an obligation to repay after the completion of their course. Edinburgh is the first city to adopt this scheme. In the event of its proving successful it is expected that it will spread to other centres.

A proposal for the extension of the retiring age of the principal and professors at Glasgow University has been rejected by the General Council of the University. At present the age limit for a principal is 70 and for a professor 65. It was proposed to add five years to the present term of both these offices, with certain exceptions. These exceptions were the professors of the Regius Chair of the Practice of Medicine, the Muirhead Chair of Medicine, the Regius Chair of Surgery, the St. Mungo Chair of Surgery, the Regius Chair of Midwifery and the Muirhead Chair of Obstetrics and Gynæcology, whose tenure of office ends when they reach sixty-five years of age; in addition the incumbents of certain other chairs whose appointments are subject to the special conditions and limitations imposed by the ordinances founding the respective chairs. It was pointed out by a member of the Court that the proposed addition of five years to the present term in both these offices would result in an addition of 200 years to the tenure of the existing professors. The prospect of the additional 200 years seemed so alarming that the proposal was defeated by 94 to 45 votes. It has been suggested that, in a well ordered world, the Court should have been considering a reduction in the retiring age rather than an extension. But that no doubt will come.

The colony for adult mental defectives in connection with the Royal National Institution, Larbert, is expected to be in operation before the present year is out, with 250 cases in residence. This colony for adult defectives is in response to a widespread desire for a permanent home for those who cannot be fitted into the families of the community. This colony will help to solve many social problems, and be a means of preventing the propagation of the mentally unfit. These adult defectives have for long been a difficult class to deal with. At present many are certified as lunatics and occupy space in mental hospitals which could be more effectively utilized for insane patients. Others are discharged to the care of the parents, which may or may not be efficient. Quite probably, the amount of crime due to mental deficiency is exaggerated, but there is no doubt that a considerable proportion of it is due to defectiveness. In any case the opening of the new colony at Larbert is long overdue and will be of the greatest use in helping local authorities to deal with the problem of the adult defective.

In the last few weeks three prominent graduates of Edinburgh University have died. On March 28th, Dr. G. M. Robertson, the Professor of Psychiatry at the University, died within a few days of intimating his resignation of his appointment as Superintendent of Morningside Asylum. Dr. Robertson was a former assistant of Sir Thomas Clouston, and before he was appointed to the Royal Edinburgh Hospital for Mental Diseases was in turn Superintendent at Murthly and at Larbert Asylums.

He was a President of the Royal Medico-Psychological Association in 1922, and was Morison Lecturer of the Royal College of Physicians of Edinburgh in 1911, 1913 and in 1927. He was President of the Royal College of Physicians from 1925 to 1927.

On April 7th the death took place of Dr. Alexander James. Dr. James graduated so long ago as 1872. He was a resident physician in the Old Infirmary, Edinburgh, in the days of Lister, Laycock, Hughes Bennett and Turner. He had a long connection with the Royal Infirmary as assistant physician and as physician, and lectured first in Physiology and later in the Practice of Medicine in the Extra-mural School. He found time to contribute several small books to medical literature. Recently he produced a book of essays and medical songs and stories, entitled "Divagations of a Doctor." He was universally beloved in Edinburgh where he was greatly in demand at medical gatherings at which his songs and stories were received with acclamation.

Sir William Watson Cheyne died on April 19th at the age of 79. The son of a Shetland sea-captain he was born on his father's ship *Lady Montague* off Hobart, Tasmania. He graduated in Edinburgh in 1875. He has been described as the "first and greatest of Lister's disciples". He succeeded Lister in the Chair of Clinical Surgery at King's College, London. Thirty years ago he purchased from the Marquis of Zetland an estate on the Island of Fetlar in Shetland. He was appointed Lord-Lieutenant of Orkney and Shetland in 1919, an appointment that was extremely popular, as he was the first Shetlander to occupy that position.

Dr. D. K. Henderson, physician to the Glasgow Royal Mental Hospital at Gartnavel, has been appointed Superintendent of the Edinburgh Hospital of Mental Disorders at Morningside, in succession to the late Prof. George M. Robertson. He has also been appointed to the Chair of Psychiatry in Edinburgh University. Dr. Henderson is a graduate of Edinburgh University of 1907. He was for six years at the Psychiatric Institute, New York, and later at the Phipps Psychiatric Clinic, Baltimore. Since 1921 he has been Physician-Superintendent at the Glasgow Royal Mental Hospital, and Lecturer in Psychiatry at Glasgow University. He is the author, with Dr. Gillespie, of the well-known text-book of psychiatry, which is now in its third edition.

Plans for the amalgamation of the Maternity Hospital with the Royal Infirmary are gradually advancing. Under this scheme the present Maternity Hospital, which dates from 1879, will cease to exist as a separate institution. The work will still be carried on and its identity preserved under the name of the "Simpson Memorial Maternity Pavilion," which will be erected on site at present occupied by the buildings of George Watson's Boys' College, as a part of the Royal Infirmary. Everything is to be done to press on with this work, and it is estimated that within three years the new Maternity Hospital, so long looked for and so urgently needed, will be an accomplished fact. The present Maternity Hospital has 91 beds. The hospital is inadequate both in size and equipment for its work at the present moment, and the staff are constantly working under difficulties. In spite of being hardly in line with the most modern medical and surgical ideas, the hospital retains the confidence of the people of Edinburgh. The total number of cases admitted or dealt with at their own homes by the doctors and nurses of the institution during the year was equivalent to 44.3 per cent of the total births in Greater Edinburgh in 1931. No person has ever been turned away. The result of this is seen in the figures for maternal mortality. In spite of the fact that every case that applied was admitted the mortality rate for 1931 was 32 in 2,463.

GEORGE GIBSON

23 Cluny Terrace, Edinburgh.

## *The Australian Letter*

*(From our own correspondent)*

Canada is shortly to be the scene of a gathering fraught with extraordinary possibilities for cooperation and coordination through the Empire. Probably the whole world is viewing this Ottawa Conference as the possible source of light from which is going to shine a tranquillizing gleam on a distraught world. No doubt sister Dominions, the distant ones, such as this for which I am the correspondent, are thinking a little enviously, perhaps, of the great meetings and parlances which are to be held and, may be, are apostrophizing the fate, which has placed them, through mileage, beyond the possibilities of even aspiring in the future to become the location of such an epoch-making assembly. One is immediately led to consider what steps are being taken by members of this profession to which we belong to bridge the gulfs geographical distance has placed between different daughter dominions and the Mother country. The common basis of a profession, and especially one which is an all engrossing life work rather than an occupation, is the best foundation for mutual understanding, regardless of intervening distances and even of race and nationality. We see a recognition of this truth illustrated frequently, and we witness efforts to employ this common denominator of interest as a means of fostering goodwill, based

on knowledge, among the peoples of the world. Thus, mention might be made of international gatherings of experts, movements such as the Pan-Pacific Union, and the League of Nations itself, where at its annual assembly, the allocation of national representatives to the Commissions is based as far as possible on specialized interest and technical knowledge. These Commissions, where the real constructive work of the Assembly is done, are characterized by intimate understanding, brotherliness, and mutual respect which members develop towards one another.

To come now to these two Dominions which are my special consideration at the moment, *i.e.*, Canada and Australia, I should like to refer to the invitation from the Canadian Medical Association to the Federal Committee of the British Medical Association of Australia, which has been circulated to all members of the Association by the medium of the *Medical Journal of Australia*. This invitation expressed the hopes that members proceeding from Australia to England to participate in the Centenary Celebrations of the parent body, should travel by Canada and attend the Conference of the Canadian Medical Association in Toronto. Whether many or few are able to accept this invitation, it is certain that the desire to do so is widespread, and it is only the special exigencies of the present world economic situation which will prevent a large response; the sincere good will and appreciation of confrères in the Southern Hemisphere will be with the Canadian Conference. The common meeting ground of the Centenary in London may, it is hoped, furnish a further kindling of interest in Australian matters and it may, perchance, lead to a considerable number of visitors from Canada to the Australasian Congress which has been postponed until 1933, when it will be held in Perth, West Australia. Efforts towards mutual understanding between members of the medical and surgical professions in widely separated countries are most worthy of fostering, for of all colleagues they can most readily get into common coordinates, as their humanitarian work has the simplest and a universal basis.

Australia has just recently had a demonstration of this brotherliness in the visit of Mr. C. H. Fagge to present to the infant Royal Australasian College of Surgeons, a mace from the Council of the Royal College of Surgeons of England. The ceremony took place in the Wilson Hall of the Melbourne University, for as yet the permanent home of the College is not built, though a site has been granted by the Commonwealth Government at the Federal Capital, Canberra.

It was originally intended that Lord Moynihan, the President of the Royal College of Surgeons of England, should make this presentation, but this was found impossible. Mr. Fagge, a former Vice-president of the Royal College and senior surgeon at Guy's Hospital, London, was the emissary and bearer of the gracious token, which was formally presented with the words— "In the name and by the authority of the Council of the Royal College of Surgeons I ask you on behalf of the Fellows of the Royal Australasian College of Surgeons to accept this mace which, my colleagues hope, may remain throughout the existence of our two colleges an emblem of the brotherly affection which binds us together." Before finally handing over the mace he addressed himself to it and among his words were— "And now companion of my waking thoughts for many months, farewell. You have I watched from earliest hours when, a plate of virgin silver, you gave yourself to be fashioned by the craftsman's skill. Gradually once a thing inanimate, your spirit has entwined itself around mine. To-day we part, but it is my hope that your new friends will ever hold you in their hearts, not only as a kingly emblem richly wrought, but as a spirit of affection which has passed from Mother country to her sons. Stay here ever to watch their future, to guide their aims, and to bless their destiny."

Later Mr. Fagge delivered the third Syme Oration in which he narrated the work of Sir George Syme, the first President of the Royal Australasian College of Surgeons, to whose untiring energy and sincerity of purpose the new College owes so much. The first of the Syme lectures was delivered by the late Frederick Dougan Bird, whose contributions to hydatid disease placed him high among surgeons. At that lecture Sir George was present. The second was delivered by Dr. A. L. Kenny and became the Memorial Lecture to Sir George Syme, for he died almost suddenly in the very midst of his unremitting public duties. Dr. Kenny, who had the closest association throughout many years with Sir George paid in his lecture this highest tribute. "Syme unceasingly gave of his best to his duty, to his work, to his fellows and to the State".

On such an occasion as this visit of the surgical embassy from the Mother country there was in the delivery of the third Syme Lecture a fitting opportunity for a tribute from a wider field. In concluding his address Mr. Fagge said, "The claim of Sir George to honour was that of the medical statesman of the generation—wise in counsel, prudent in conduct, tactful in method. One could not choose for him a better epitaph than the words with which he opened his British Medical address in Melbourne in 1920—*Ich dien.*"

The following day the University of Melbourne conferred on Mr. Fagge the degree of

doctor of medicine by special grace. The words of the Chancellor, Sir John MacFarland, were, "This is a meeting of the Council for the purpose of conferring a degree by special grace on the representative of the Royal College of Surgeons of England. This is the only articulate method of expression which the University has of conveying its respect for the great profession of medicine, for the Royal College of Surgeons of England, and for its representative who is with us on this occasion. It expresses not only our regard for the profession and for the College, but also our gratitude to the Royal College of Surgeons of England for the kindly and brotherly interest it has taken in the foundation of the new college of surgeons in Australia and New Zealand."

It is a happy coincidence that only late last year did the Royal College of Surgeons of England carry out for the first time in Australia the examinations for the Primary Fellowship of that College. For this purpose visiting examiners were appointed from England, who had as colleagues Professors of Anatomy and Physiology of the University of Melbourne. That ten out of the twenty candidates in Australia, who presented themselves for the primary examination were successful is evidence of the solid preparation and enthusiastic work which had been going on prior to the visit.

The Australasian College of Surgeons is not an examining body but requires a higher surgical degree for membership. It has been established partly on the tradition of the Royal College of Surgeons of England and also in part on the plan of the American College of Surgeons, in that it requires a record of surgical achievement for fellowship. It aims at fostering surgical reasearch, and during the year has been the recipient of a benefaction of £40,000 from the estate of the late Robert Gordon Craig, surgeon of Sydney and this sum is to be devoted to the furthering of research and the training of surgeons. The College issues its own publication *The Australian and New Zealand Journal of Surgery.*

During his visit Mr. Fagge delivered in three capital cities post-graduate lectures on surgical problems. The great interest which has been displayed and the enthusiasm which has greeted the post-graduate lectures by illustrious overseas visitors, demonstrate the need which existed for such organized instruction. These post-graduate lectures are more, too, than mere academic or professional teachings; they are real links of Empire.

ETHEL E. OSBORNE

The University, Melbourne.

# Letters, Notes and Queries

## The Examining and Licensing of Physicians To Practise Medicine in Canada

*To the Editor:*

The present system of examining and licensing medical graduates to practise medicine in Canada is inadequate and unfair, not only to the man involved and to the medical profession itself, but to the public, who are most concerned. Presumably the function of the Dominion Medical Council and Provincial Examining Boards is to ascertain whether a medical graduate is suitable and capable of practising medicine in any community. The suitability and capability of a physician connotes more than academic book knowledge. It entails a man's character, his ability, his experience, his personality and his health. Of these factors very little, if any, notice is taken, by the examining boards. The candidate has simply to pass a type of medical school examination. His experience, which takes time to acquire, is not only not taken into consideration, but acts as a positive disadvantage. The present system takes account only of the candidate's ability to know or memorize an amount of academic book work, whether he can speak English and is obviously not, to the oral examiner's transitory opportunity to discern, a moron.

It will possibly not be received kindly when I say that, except for the extremely small number of prospective candidates who have graduated outside our own country, there is no need whatever for the present system of licensing graduate students and practitioners of some experience, who have graduated in Canada.

We have eight medical schools. It seems reasonable to ask, why in order to practise a graduate of our schools has to pass another examination, with the time, trouble, and expense (fees of over one hundred dollars) involved. If our universities see fit to equip through a period of seven years' training and graduate a man to enter upon his medical career, surely this is sufficient. To ask him to pass these further examinations is not only unnecessary, but is an insult to the standard of our medical schools, all of which have good ratings.

As things are, the graduate who has just emerged from his medical shell, who has great theoretical knowledge but of practice little experience, who of tabes, tuberculosis and trematodes has tremendous understanding but of the common cold, dyspepsia and diarrhœa, little knowledge, has a much better opportunity of passing the examinations of the licensing boards than the graduate of several years' practice or hospital experience. Again it is freely admitted that our medical leaders, or any with several

years' practical experience, could not pass the examinations without prodigious academic preparation.

The present type of examination is essentially prepared for those medical graduates who purpose entering general practice, and takes no account whatever of the specialist, the man who has spent years in the preparation of his specialty and intends to confine his life work to that special department of medicine. The specialist may present himself for the examinations of the licensing boards and out of the thirty questions in the written papers and many more in the oral tests, may not be required to answer one question pertaining to his own specialty.

The majority of our fraternity and even many of the officials of the licensing boards realize and appreciate the pitiful shortcomings and futility of the present system, but the former are either indifferent or feel their impotency to cope with the situation, and the latter are holding remunerative positions. So the old order changeth not. The medical body of Canada tolerates such a futile, inadequate system.

In order that this outburst may not savour too strongly of the writings of H. L. Mencken and his usual destructive criticisms, I will offer a few suggestions of a constructive nature.

1. Abolish all Provincial Examining Boards.

2. For graduates of our own medical schools passing of the final graduation examination of their medical school and one to two years' internship in an accredited hospital should be required before giving them a licence to enter upon general practice. No further examinations should be required. Those intending to take up a specialty should be required to have at least one year of rotating internship and two to four years' internship on specialty in an accredited hospital for specialty, the period depending upon the specialty. A specialist's licence should be given, and a man not be allowed to practice his specialty or pose as a specialist without this special licence. The hospitals should require an interne to come up to certain prescribed standards before conferring a certificate of internship.

3. A smaller, yet adequate, board representing the Dominion Council should be retained to supervise the licensing of graduates of medical schools outside Canada, to be held once a year in one central medical centre.

4. That a licence obtained from the Dominion Council permit a medical graduate to practice in any part of the Dominion of Canada. This for the inclusion of the Province of Quebec.

5. Reduce the Dominion Medical Council fee from one hundred to fifty dollars.

6. The examinations should be prepared and varied for the candidate entering upon general practice or a specialty, the specialist's examination being on his specialty.

It is realized that changes as drastic as these would necessitate the oiling of government machinery and could not be instituted overnight. They are only offered in order to awaken the profession of Canada to see that they might bring force to bear, so that a fair, reasonable and modern system may finally be inaugurated to supplant the antiquated, iniquitous and inequitable system under which we are now labouring. We must eradicate a poor system, even though it is well established, for one of efficiency and one that is fair to all, the community, the individual physician and the profession of the Dominion.

R. H. WIGGINS, M.D., C.M.

Victoria, B.C.
May 20, 1932.

# Topics of Current Interest

## On Charity

### Charity Begins at Home—But Where is it Going to End?

On this particular occasion the Man-with-a-Grievance was late for tea. In the absence of any widely known catastrophe, this was a justifiable reason for surprise among the assembled company. After he had poured his tea he was asked by someone to explain the unusual fact that he was late and also apparently annoyed. He finally explained to us that he was really annoyed with himself because, as he put it, he had allowed himself to try to teach something to a confirmed idiot. This was really his way of saying that he had been drawn into a discussion with someone with whom he had disagreed. It seemed that he had been talking to one of those *Professional Uplifters* who, with the exception of Prohibitionists, were his most striking aversion. This person, we learned, had had the hardihood to suggest to the Man-with-a-Grievance that all medical services should be directed by a group of people who had particular experience in Social Service Work. The plan, it seemed, in essence was that the expectant mother was to be cared for and visited by a pre-natal nurse, and referred, when necessary, or in other words when the nurse considered it necessary, to an obstetrician. She was ultimately to be admitted to hospital for delivery, and after discharge from hospital was to be visited by a post-natal nurse and report again when necessary to the doctor. The child was also to be commandeered by a child health nurse who would supervise its feeding and bring it along to the pædiatrician from time to time. From here on the process was to be continued from the cradle to the grave, with constant supervision of the citizen by a succession of

maternity, infant and what-not nurses. Then we would have reached the point where a body of people, who had started out to be an auxiliary organization, would end up by being in control of the whole structure—another example of the tail that wagged the dog. As the Man-with-a-Grievance expressed it, we were to have the whole fertile population under the thumb or thumbs of a collection of bureaucratic officials.

The situation was amusing for two reasons. In the first place the proposals were so bizarre as to be amusing, and in the second place the idea of anyone being so reckless as to give the Man-with-a-Grievance an opportunity to develop one, was also sufficient cause for surprise and mirth.

The Strong Silent One attempted to adopt a detached attitude by remarking that the proposals that had been put forward by the *Uplifters* were radical, not so much in their principle, but rather in their extent. The Cynic then proceeded to point out that the rather fine, but withal perfectly logical, differentiation that had been made out by the Strong Silent One was not the important point. What really mattered was the fact that the chimeric plans of the *Uplifter* had shown us, in all its stark and forbidding nakedness, the ultimate form of the fantastic structure that was actually being reared in our midst.

Following these two interruptions, the Man-with-a-Grievance proceeded and pointed out that, in the case of Medical Services, all these bureaucratic systems in their development had absorbed most of the charitable organizations started by private persons or groups of persons. In some cases these charities had been started by people who found no natural and direct outlet for their latent energies. The present organizations still attracted to their ranks many people of this type, but, with our modern habit of trying to alter or conceal facts by changing their names, few activities were now referred to as charities. They were varnished over with meaningless terms of Public Welfare or Social Services. Further, few of the services and little of the money spent were voluntarily contributed. In fact, what really constituted a new vocation had been developed as the result of the increase in these services. The Man-with-a-Grievance compared the modern professional social worker to the professional mourners found in China. The salaries paid to these people were equal to if not better than those which they would be liable to earn in any other calling. In the case of the finances a great deal of the money was at present contributed either directly or indirectly by the taxpayer. The only real charity was contributed by the free services of the medical profession, and yet they seemed incapable of recognizing this fact.

As the Man-with-a-Grievance continued, he appeared to prove with rather sketchy but, to the uncritical listener, relentless logic, that if we continued with the present process of increasing so-called social services we would end by having the whole of the active, virile and self-supporting portion of the population paying out the result of its hard labours to support a pampered and useless collection of sociological misfits under the control of a large army of governmental or semi-official autocrats. He alleged that, even at the present time, the process had progressed much further than the average person realized. The system was rather like an innocent tumour which had been ignored until it was beginning to assume a malignant character and had started to increase in size, infiltrate, permeate and form metastases throughout the whole social fabric and was beginning to choke the very life out of the economic structure of the country. The time was not far distant when the greatest asset a man could have would be the inability to look after his own affairs. This state would automatically result in his being cared for in a way that would make the most favoured aristocracy in history appear by comparison as mere beggars. He suggested that the process would continue until the poor taxpayer who was supporting this useless structure rebelled, and the misfits and the officials would be thrown out together. Then, all the really useful charities that had been developed might be lost along with the ridiculous ones and we might have to start from the bottom and build up the whole structure again.

The Cynic had listened to this oration with patience and evident interest, and although he seemed to be amused by the hyperbole of the speaker he obviously agreed with the principles of his argument. He suggested that, although the enthusiastic supporters of welfare work might or might not be wrong in their objective, their good intentions were indisputably genuine in most cases. Further, the medical profession probably as much as any other group of the people were guilty of neglecting to keep many of these developments within reasonable proportions, because many of these activities concerned their work. Without the misguided cooperation of the medical profession most of these services could not be continued. Therefore since they were largely responsible for these activities the profession, even if it had not the common sense to see that its own interests were safeguarded, at least had a responsibility to the general body of the people. They should insist on maintaining a controlling influence in these insittutions to see that these activities were kept within the bounds of what

was economically sound and reasonable. While these services were run as purely voluntary charities, a check was naturally kept on their progress. Now this was removed, for many people controlling them derived their living from so doing and naturally wanted to see them increase. The efficiency of social workers should be judged by their success in helping a family to so improve their position that they would no longer require the assistance of private or public charity. We should find them reporting that in the case of a given institution that whereas last year fifty families had required assistance, this year they had been able to aid these people in such a way that only forty required charity. Instead, we find them gloating over the fact that the number of dependents has been increased to seventy-five. Of course this increase served to make the economic position of the social worker more secure. In allowing the system to get out of its control and into the hands of professional social workers the profession was neglecting its duty both to the patients and to the general public. Had these services been put on an insurance basis when an attempt was made to make them universal, their growth would have been automatically controlled by the necessities of the case. Between his usual puffy interruption in lighting his pipe, he also suggested that the ultimate end might not be so tragic as the Man-with-a-Grievance prophesied. We were fortunate in this country in the time at which all this was occurring. For the first time in many years thousands of people were beginning to realize that the government's money was the taxpayer's money and to examine with a critical eye the customary attempts of the politicians to be generous with the taxpayer's hard earned money. And all these services cost money and we were living at a time when the general body of citizens was beginning to ask by whom they themselves were to be supported after the tax-gatherer had filched them of their last hard-earned penny to use as a subsidy for idleness and inefficiency. Therefore, we were, so far as this matter was concerned, living in a fortunate age because the unnatural process was likely to be arrested by the force of circumstances before it proceeded much further.

The discussion might have been continued indefinitely had not the Timid One risen to get his coat and hat. Someone asked casually why he was in such a hurry. He replied that he was off to the hospital to do his usual free clinic. At which point the Cynic remarked that he had to return to his practice, although he believed that most of the work he might do would likely end up by being free also.—*The Manitoba Medical Bulletin,* 1932, **12**: 126.

## The Way of Health Insurance

According to Mr. A. M. Simons and Dr. Nathan Sinai, who have just concluded a two-year investigation of the situation in the United States and abroad, with 20 to 30 per cent of the sick in this country not at present receiving adequate medical care, some form of compulsory health insurance is almost certain to be adopted to care for these people. Their reports is being published in book form by the University of Chicago Press under the title, "The Way of Health Insurance."

The social, economic and political conditions that led to the enactment of health insurance laws in all leading European countries are now present in the United States, they say, and the pressure for this relief measure is increasing. Health insurance bills are now before the legislatures of several states, and similar bills are being drafted in other states. "Health insurance," they state, "is neither a panacea for all preventive and public-health problems, nor the bureaucratic state medicine so abhorrent to the other extremists. Notwithstanding the many faults and deficiences of the various systems, no country that has ever tried compulsory health insurance would be willing to go back to pre-insurance days, and notwithstanding their conflicts with its policies, there is practically no opposition in the medical professions of any insurance country to the principles of insurance. Nor has any dental association in any insurance country ever officially condemned the system of insurance.

"In Great Britain and Germany all medical and dental service is free to the patient, but he must choose his practitioner from an approved list. In Germany the families of the insured are covered. In Great Britain they are not. The British system differs from the German in the further respect that specialist services are not included, and medical service is, as far as practicable, divorced from the social management that determines whether cash benefits shall be paid. Our investigation leads us to believe, most decidedly, that separation of the medical service from the administration of cash benefits results in a more efficient and honest operation of the system. Cash benefits in time of sickness, like those for old age, widowhood, unemployment, military services, etc., should be based upon economic conditions in which health is but one factor.

"As to the effect of compulsory health insurance laws upon the practice of physician and dentists, we found, in all countries, that while there is wide variation in professional incomes under insurance, they will average at least as high, and probably somewhat higher, than they were in private working-class practice before insurance. There is no loss by bad debts, and there is a much larger sum of money expended

for the work of physicians and dentists. There is less idle professional time; the average insurance physician and dentist does considerable more work and receives more pay than he did before the installation of insurance."

"Their report," says Dr. Herbert E. Phillips, chairman of the Committee on the Study of Dental Practice, "will serve as a warning to the physicians and dentists of this country that if they do not take a hand in formulating the policies of any insurance system that may be installed in the United States, the professions may find themselves in conflict with its practices when it is too late."

## Medico-Legal

### Alleged Injury from Negligence

Referring to a recent item (*Canad. M. Ass. J.*, 1932, **26**: 743) dealing with a decision by the Court of Appeal of Ontario as to the evidence necessary to prove that an alleged injury resulted from negligence, etc., it may be now considered settled law that, unless the connection be obvious—as the legal term runs, *Rex ipsa loquitur*—this must be proved by the evidence of a medical man.

In a recent case, a lady sued a beauty parlor for an injury she claimed to have been caused by electricity negligently applied by the parlor. She did not prove by medical evidence that such an injury could be so caused, and the Court of Appeal of Ontario held that she had not proved her case. This makes the law in this respect most satisfactory.

### Allen vs. Froh

In this action the plaintiff, a medical practitioner, sued to recover for services rendered to the defendant's sister. The Trial Judge in the District Court in Saskatchewan gave judgment for the plaintiff for the full amount of the claim. From this judgment the defendant appealed, and the Saskatchewan Court of Appeal allowed the appeal with costs and set aside the judgment. In this case it was held that the law does not raise an implied promise on the part of a person who calls a physician to perform services for another, to pay for such services, unless the relation of such person to the person who is ill is such as to put him under obligation to provide medical attention for the patient, or unless the circumstances are such as to show an intention on his part to pay for the services rendered. Such obligation does not arise from the relationship of brother and sister.

### Matheson vs. Smiley

This was an appeal by the defendant from a judgment of the Judge of the County Court of Brandon, Man., which allowed the plaintiff's claim for professional services for an operation upon one John J. Smiley, the defendant being the executrix of the deceased. The appeal was dismissed by the Manitoba Court of Appeal with costs. In this case the plaintiff, a surgeon, sued to recover from an executrix his fees for operating on the testator. The latter had been found in his home in a very serious condition as the result of a wound from a shot gun, which had apparently been discharged by his own hand. The defendant was not dead, but two friends who were in the house called in a doctor immediately after making the discovery. The doctor, considering the case to be a surgical one, brought in the plaintiff. The wounded man said something to the plaintiff, but the Court found that he was in such a condition that no words of his could be construed as a request for the plaintiff's services or as an acquiescence in their being rendered on a contractual basis. Section 63 of The Medical Act, which provides that every person registered thereunder shall be entitled to sue to recover reasonable charges for professional aid, was held not to give by itself a cause of action in the absence of even the ordinary requisites of an enforceable contract or some legal obligation on someone to pay, and therefore the question was whether under the circumstances the defendant as executrix was under that obligation. It was held that the plaintiff was entitled to recover and that it could not be said that the Trial Judge was wrong in finding on the evidence before him that the amount of the fee sued for was not unreasonable.

"A circumstance which brings physicians into contempt is that many diseases are too little removed from the borderline of health and are thus difficult to recognize and cure; others, malignant in themselves, externally appear trivial. When the layman sees that the physician is in doubt concerning his cure he draws it as a certain inference that the physician will understand less of severer and more extensive illnesses. This is a false analogy. The symptoms of such diseases are less obvious because they are slighter deviations from the normal, and their cure is more difficult because no drastic remedies can be applied, but only those the effect of which is gradually brought about, such as diet, etc. An official of the hospital once complained of difficulty in moving some of his finger-joints on account of a small but very hard sore which had for some time resisted the remedies he had applied. He openly reviled the physicians, saying:—'If your art does not suffice to cure a small sore on the finger, how can you treat broken ribs and arms?' He then sought treatment from the women and the vulgar."—*Rhazes.*

# Abstracts from Current Literature

## MEDICINE

**A Present-Day Review of Gastric and Duodenal Ulcer.** Miller, R. H., *New Eng. J. Med.*, 1932, **206**: 925.

Gastric ulcers occur on the lesser curvature, usually near the pylorus; benign ulcers never occur on the greater curvature, and duodenal ulcers are usually within an inch of the pylorus. Disturbances in the relaxation of the pyloric sphincter probably have a great causative effect, in that such disturbances prevent the normal regurgitation of alkaline duodenal contents into the stomach to neutralize the irritating acid of that organ. The finding of the same strains of streptococci in ulcers as in distant foci is an observation of enough constancy to demand consideration. The familial tendency to peptic ulcer is constantly noted, also its seasonal recurrence. Einhorn in a study of 800 cases found the greatest number of recurrences in September and May.

The old method of examining the stomach contents, first fasting, then after the Ewald test meal, is a sound procedure and should not be given up. This test has recently been modified or changed with the use of alcohol, and also by the hypodermic injection of histamine. While these modifications have their place, they should not be allowed to supplant the former technique. The roentgenogram is the most reliable diagnostic weapon, and is usually dependable in 90 per cent of the cases. McCarty finds that the earliest discoverable cancers have been in the borders of chronic ulcers and that most ulcers of a diameter of 2.5 cm. or more are already cancer. In his opinion the great majority of gastric cancers develop in the chronic gastric ulcers, and 10 per cent of all ulcers are, or will become, malignant. Alvarez notes that most large lesions are malignant, and most small ones are benign, but the point which he emphasizes most strongly is that the roentgenologist cannot always be sure.

In cases of ulcer of the stomach, presumably not cancerous, Lahey gives the following treatment: (1) three weeks in bed with careful dietary treatment; (2) weekly gastric lavage for analysis of the stomach contents; (3) fluoroscopy at regular intervals; and (4) subsequent return for examination and check-up every two months. If at the end of three weeks the ulcer is seen by x-ray to have decreased in size, conservative treatment may be still further carried on; if it has increased one must suspect cancer and operation should be advised. In the case of working men with gastric ulcer to whom the loss of time is a matter of grave importance it is better to advise operation at once. A recent suggestion for the treatment of peptic ulcer, gastric or duodenal, is the use of gastric mucin, which has certain value in the neutralization of excess acid.

We assume that a duodenal ulcer is not and never will become malignant. Cancer of the duodenum is so rare as to constitute a pathological wonder. The chronic patient, with mild recurrent symptoms can perfectly well be handled as an ambulatory case, on a careful six-meal diet. Cases for operation must be carefully selected and should be those that have definitely failed to be cured after long and careful medical treatment. Balfour says that the duodenal patients who do badly after operation are those who are young, who have no pyloric obstruction, and who have a high degree of hyperacidity.

Bleeding from peptic ulcer is one of the serious events which arise often without warning but, as a general rule, bleeding ulcers do not perforate, and perforating ulcers do not bleed. For acute hæmorrhage the patient should be put to bed, given nothing by mouth, fluids by clysis or vein, and morphine at regular intervals. If bleeding persists one transfusion and then another should be given before operation is decided upon; if operation seems to become imperative it should be undertaken only if at least one or more blood donors are present. Soper has recently recommended the placing of a duodenal catheter in the stomach in these cases; the catheter removes clots and gastric contents and on the third or fourth day it may be allowed to pass through the pylorus and the patient be fed through it.

A patient with dilated stomach from pyloric obstruction must be kept in bed for several days before operation, the stomach emptied by tube once or twice a day, and food by mouth restricted. The work of Shelburne and Egloff has demonstrated the occurrence of œdema as a result of the restriction of proteins, and observations are being instituted on the post-operative fluids, as we are gradually becoming to believe that perhaps we force salt and sugar too much and give too little protein. After any gastric operation the patient should continue with his diet, and consider himself still an ulcer patient.

LILLIAN A. CHASE

**The Treatment of Older Diabetic Patients with Vascular Disease.** Goskin, J., Strouse, S., Katz, L. N. and Rukinfeld, S. H., *J. Am. M. Ass.*, 1932, **98**: 1703.

Arteriosclerosis accounts for a much larger percentage of deaths among diabetics than before the use of insulin, and the heart is affected more than the rest of the cardiovascular system. Coronary sclerosis and thrombosis, infarction, and myocardial degeneration

all occur. Diabetes unquestionably causes a great deal of arteriosclerosis leading to coronary thrombosis. This is only partly because insulin is prolonging the lives of diabetics. Patients with this disease show a much higher incidence of arterial disease as revealed in the younger diabetics. Thus, although insulin has to a great extent eliminated coma deaths, it is responsible for a number of cardiac deaths. Insulin shock is a real hazard to the heart, and in this is closely associated with hypoglycæmia. Anginal symptoms of varying degrees follow the administration of insulin. This makes the use of insulin in arteriosclerotic diabetics doubtful, also the lowering of the blood sugar by diet restriction.

Seven patients with clinical evidence of coronary sclerosis or angina were studied, their blood sugar was kept at a "low normal level". In every case following the giving of insulin, there was a fall in blood pressure, rapid heart, irregularity, paroxysmal tachycardia, and even typical anginal attacks. The electrocardiogram showed confirmatory changes, usually indicating intraventricular block. Subjectively the patient noticed a decreased sense of well-being, weakness, palpitation, precordial pain, prostration etc. One patient, on a low carbohydrate diet without insulin, had much cardiac distress which was relieved when she was put on a high carbohydrate list. "Acute" experiments as well as therapeutic were carried out. Twenty-five units of insulin brought on an attack of auricular fibrillation with ventricular extrasystoles. This showed in the electrocardiogram before distress was noticed by the patient.

Orange juice, cane sugar, and intravenous glucose relieved the symptoms in a few minutes. It may be possible that such patients require a higher blood sugar level than others, and it is perhaps the change in the level of blood sugar from the customary state that causes trouble. The diseased myocardium requires sufficient carbohydrate nourishment.

P. M. MACDONNELL

**The Form of Premature Beats Resulting from Direct Stimulation of the Human Ventricles.** Marvin, H. M. and Oughterson, A. W., *Am. Heart J.*, 1932, **7**: 471.

This article is a report of the observations upon the form of electrocardiographic curves derived from the artificial stimulation of known areas upon the exposed human heart. The opportunity for such observation is necessarily rare, this being the second report appearing in the literature, and it confirms the work of Barker, Macleod and Alexander appearing in 1930. It was necessary in the treatment of this patient to perform a pericardiotomy, so that the opportunity to observe the effect of stimulation on known points of the ventricle presented itself. By use of prepared electrodes the posterior surface of the heart could be stimulated. It is distinctly shown that premature contractions derived from stimulation of the right ventricle have the chief initial deflection upward in lead 1, while those from stimulation of the left ventricle have the chief initial deflection downward in lead 1.

W. H. HATFIELD

**The Opening Snap in Mitral Stenosis.** Margolies, A. and Wolferth, C. C., *Am. Heart J.*, 1932, **7**: 443.

The authors describe in some detail what they characterize as the opening snap in mitral stenosis, namely, a characteristic snapping or clicking sound occurring shortly after the second heart sound and usually heard best in the fourth left interspace, sometimes being audible over the whole præcordium. It can be noted in over half the cases of mitral stenosis and has never been recorded in the absence of mitral stenosis. It usually occurred 0.06 to 0.11 seconds after the beginning of the second sound, is best elicited in the recumbent position, and tends to be louder when the heart rate is rapid. All available evidence is in accord with the hypothesis that the sound is produced by the sudden limitation of the opening movement of a stenosed mitral valve, which occurs early in diastole as soon as the left ventricle relaxes sufficiently to permit the pressure of the auricular blood column to become effective. It is pointed out that the sign is easily differentiated from all other sounds and is clearly audible in many cases in which the murmur is so slight as to be easily missed. The evidence appears to indicate that the presence of the opening snap is practically pathognomonic of mitral stenosis.

W. H. HATFIELD

**Further Studies in Allergic Migraine.** Balyeat, R. M. and Rinkel, H. J., *Ann. Int. Med.*, 1931, **5**: 713.

**Allergic Migraine in Children.** Balyeat, R. M. and Rinkel, H. J., *Am. J. Dis. Children*, 1931, **42**: 1126.

These papers have so much in common that they are reviewed together. The authors refer to previous work by Vaughan and by Rowe who support their main contention that migraine is caused in all cases by specific sensitization. The evidence presented is as follows: (a) Migraine commonly begins in the first decade, and before the age of 20 in about 60 per cent of cases. This is quite similar to the age incidence of other allergic diseases. It is not generally realized how common migraine is in childhood. (b) Migraine is most frequent among business and professional men and teachers—and other allergic diseases are also commonest

in this class. (c) Heredity is the most important known factor in the etiology of migraine and of the allergic diseases. (d) Migraine is interchangeable in the family trees with asthma and hay-fever. In his series of 202 cases "a positive family history of migraine, or a family history of the well accepted allergic diseases, was elicited in 82.1 per cent." (e) Many migrainous patients suffer also from other manifestations of allergy. (f) Migraine may be relieved by the avoidance of substances to which the patient is found sensitive.

Not all headaches are migraine. The diagnosis is made from the following considerations. (a) The family history; (b) personal history of other allergy; (c) approximation to the typical history of migrainous attacks, namely, the occurrence of symptoms in four stages, prodromal, aura, attack, and post-migrainous phases; usually hemicranial location of headache and nausea with or without vomiting; (d) physical examination to rule out other conditions, among which must be considered "pituitary headache"; (e) skin tests; (f) clinical effect of eliminating or feeding suspected foods.

The pathology of the attack is thought to be multiple patches of cerebral œdema. Migraine does not always disappear in the fifth decade. Twenty-two of 202 consecutive cases came seeking relief in the sixth decade. Cyclic vomiting in children is thought to be a manifestation of migraine in these ages. Children with cyclic vomiting often develop migraine in later life. The association of headache and vomiting with abdominal pain has sometimes led to the erroneous diagnosis of appendicitis.

The chief foods to which these patients have been found sensitive, in order of importance, are milk, wheat, eggs, nuts, beans, fish.

Treatment consists of: (a) pre-marital advice. If both parents are allergic, about three out of four children of the union will be allergic; (b) correction of predisposing factors; (c) elimination from the diet of specific protein exciting factors.

The results of the treatment of 202 consecutive cases were: Total or more than 80 per cent relief in 21.7 per cent; between 60 and 80 per cent relief in 37.6 per cent; between 40 and 60 per cent relief in 28.7 per cent; little or no relief in 12.0 per cent.

T. G. HEATON

## SURGERY

**A Complication of Tarry Luteal Cysts.** King, E. J. S., *Arch. Surg.*, 1932, **24**: 292.

In recent years there has been much discussion concerning tarry and chocolate cysts of the ovary, especially about those having an epithelial lining. The evidence is circumstantial that these cysts have a uterine origin. Some investigators have shown that many of the tarry cysts have a luteal origin. It is not yet proved that these cysts, the endometriomas and the tarry luteal cysts, are identical. King reports two cases. The first was in a woman of 27 who at operation was found to have a number of cysts of varying size among the adhesions in the omentum at the back of the uterus. Some contained yellowish fluid, others old blood. A number of small tarry cysts were found in the right ovary. There were dense adhesions in Douglas' pouch. The ovary, tube, and omentum were removed. On microscopical examination, the walls of the ovarian cysts showed luteum-like cells in various stages of retrogression. The omental cysts showed cells in the walls similar to the luteal cysts of the ovary, but were probably phagocytic. Columnar cells were found in one or two of the cysts and in the dense tissue in the recto-vaginal septum. The second patient was a girl of 14 who had had hypogastric pain for four days every fortnight, and an absence of menstruation. On abdominal section a large bilocular blood cyst of the right ovary was found. This was removed together with the Fallopian tubes. Microscopically, the cysts were found to be luteal. Six months later, owing to the presence of continued lower abdominal pain and a mass in Douglas' pouch extending to the left side, a second operation was performed. The uterus was of about normal size. The left ovary contained a blood cyst and there was a small blood cyst on the walls of the sigmoid colon. The uterus, left ovary and nodule on the sigmoid were removed. There was atresia of the uterus. On microscopical examination the cysts of the ovary were found to be luteal, with epithelial glands in their walls and in some places the inner surface was lined with tall columnar epithelium. The nodule from the wall of the sigmoid showed, microscopically, a number of small blood cysts lined with tall columnar epithelium, and a stroma of small round cells and spindle cells and "glands" in the wall beneath the epithelium.

Where peritoneal cysts secondary to tarry or chocolate cysts of the ovary are found a diagnosis of endometriosis is usually made. Tarry cysts of luteal origin may also produce secondary cysts, which necessitates a thorough examination of any blood cyst of the ovary, before a definite diagnosis may be made. Of interest is the effect on the peritoneum of the spilling the contents of the cysts, with the development of secondary epithelial lined cysts, as in the cases described, since the dense fibrous tissue reaction associated with the rupture of "endometriomatous" cysts has often been observed, but the fibrosis associated with tarry luteal cysts has seldom been recognized.

G. E. LEARMONTH

**Operations on the Superior Pole of the Thyroid.**
Roeder, C. A., *Arch. Surg.*, 1932, **24**: 426.

Roeder's object in this paper is to demonstrate that the removal of the superior pole of the thyroid gland, although easier, may be followed by at least as many complications as resection of any other portions of the gland. Certain accidental injuries to the recurrent laryngeal nerves and to the parathyroid glands have drawn most of the attention of surgeons to the middle and lower portions of the thyroid gland. From Roeder's observations on over 1,800 thyroidectomized patients there has been a high percentage of changes in the tone of the voice, lasting for varying lengths of time. These changes, as well as moderate obstructions to inspiration, are usually of short duration and nearly always caused by a congestion of the mucous membranes of the larynx, loss of vocal cord tension, and temporary injuries to the superior and inferior laryngeal nerves, producing incomplete abductor and adductor vocal cord immobility. Hysteria may be an important factor. Aphonia, or laryngeal dyspnœa, often does not follow surgical trauma during thyroid resections, though there are instances where adductor or abductor vocal cord paralysis may occur where the surgeon feels certain that the inferior laryngeal nerve had not been injured. On the other hand, the surgeon has been surprised that after the removal of deeply lying and adherent adenomas, there has been no vocal cord involvement. These varying experiences suggest that there is occasionally an irregular innervation of the larynx. There is a loss of voice following adductor paralysis and laryngeal dyspnœa from abductor paralysis; both of these lesions are usually considered to be due to injury to the inferior laryngeal nerves. Paralysis of the cricothyroid muscles supplied by the superior thyroid nerves produces a loss of vocal cord tension, resulting in a husky and lower tone of voice. Largely because of post-operative changes in the voice, obstructive dyspnœa and tetany, the technical attention of surgeons has been directed to the middle and lower portion of the goitrous thyroid gland. Roeder states that his object in this paper is to demonstrate that the removal of the superior pole of the thyroid, although easier, may be followed by as many complications as resections of any other portions of this gland. The parathyroids may often be situated lower than the superior pole and are here of less surgical importance. Sometimes the only parathyroids present may be attached to the superior pole. He traces the pretracheal fascia over the superior pole, which it covers anteriorly, medially and laterally, but not posteriorly, binding this portion to the lateral surfaces of the laryngeal cartilages and muscles and encapsulating the superior thyroid vessels. The external branch of the superior laryngeal nerve is contained in a separate compartment on its medial surface. Opposite the thyrohyoid membrane this fascia is attached for several centimetres to the internal branch of the superior laryngeal nerve. Strong traction downwards on the superior pole and fascia, with or without mass ligations, may injure the internal as well as the external branch of the superior laryngeal nerve.

In an endeavour to ligate the superior thyroid vessels before they reach the upper level of the superior pole of an enlarged gland with a high superior pole, the ligature or clamp will lie close to or opposite to the thyrohyoid membrane and the internal as well as the external branches of the superior laryngeal nerve may be injured. In ligating the posterior branch of the superiod thyroid artery the recurrent laryngeal nerve may be traumatized, or, with a high lying inferior thyroid artery along the lateral surface of the superior pole, the inferior laryngeal nerve may be involved.

G. E. LEARMONTH

**The Injection Treatment of Varicose Veins.**
Lewis, K. M., *Ann. Surg.*, 1932, **95**: 727.

Sodium chloride 20 per cent, sodium salicylate 20 to 40 per cent, dextrose 50 per cent, dextrose 50 per cent with sodium chloride 30 per cent, and quinine and urethane have been used by the author. The best results were obtained with the quinine and urethane, and with sodium salicylate. The latter frequently caused severe pain lasting 2 to 3 minutes, so its use was discontinued for that reason. Veins are injected with the legs in the pendent position. The site of the injection is painted with 3.5 per cent iodine. The first injection is in the lowest veins. Injection is done once per week, 0.5 c.c. the first time, and 1 to 2 c.c. at subsequent treatments. A small sterile compress is held over the site of injection for 2 or 3 minutes. It is then strapped on. The patient is allowed to go home following each treatment.

Care should be taken that none of the solution is injected outside the veins. The position of the needle should be checked by withdrawing a little blood. More may be withdrawn when about half the fluid is injected. Sloughing may result from escape of the quinine and urethane. These sloughs take a relatively long time to separate and heal. Surgical excision is of no value. Two to three days after injection redness and swelling may occur, due to periphlebitis. Some temporary disability may result. Recovery is spontaneous in two or three weeks. Ninety per cent of varicose ulcers treated have been cured. In these cases enlarged veins have to be found by palpation.

One constitutional reaction to quinine was noted in a series of 2,000 injections. No reaction to salicylates was seen in 800 such injections.

Recurrences are exceedingly small. If the internal saphenous trunk in the thigh is not thrombosed recanalization of the veins in the leg below is more likely to occur. Occasionally new varicose veins develop.

Contraindications to treatment are: (1) active bacterial thrombophlebitis; (2) previous thrombosis of the deep veins. The author has never seen a case of embolism following the injection treatment.

STUART D. GORDON

## OBSTETRICS AND GYNÆCOLOGY

**The Menopause and Its Complications.** FitzGibbon, G., *Brit. M. J.*, 1932, **1**: 924.

After discussing a case in which mental symptoms lasting over a year and diagnosed by an alienist as being due to pre-senile dementia were entirely relieved by total hysterectomy, the normal character of the menopause and the condition of the uterus are thus summarized.

1. The menopause consists of an atrophy of the genital organs from the developed state adaptable to child-bearing to a state closely resembling that of the organs preceding puberty.
2. This change should occur without either physiological or mental disturbance.
3. It normally commences between the ages of 42 and 46, and is completed within two or three years. There are normal exceptions on both sides of these ages.
4. The uterus at the beginning of the menopause should be little, if at all, larger than the uterus of a young nulliparous woman, that is, three inches in length, with a proportion of body to cervix of two to one, and the cavity two and a half inches long.
5. When the atrophy of the menopause is complete, the uterus is completely reduced in size in all its parts, being two to two and a half inches in length, and having no vaginal portion of cervix.

As a result of trauma, infection, retroversion or fibroids chronic hyperplasia of the uterus, chronic metritis or chronic cervicitis may develop. In consequence of these the menopause may become pathological.

FitzGibbon draws these conclusions: (1) the menopause should occur with as little disturbance as puberty; (2) during the child-bearing period of life many women acquire pathological lesions of the uterus which frequently induce chronic bacterial infection of the uterine body and cervix; (3) when the atrophy of the menopause occurs the toxic influence of the infection is stimulated; (4) the pathological lesions delay and disturb the normal course of the menopause; (5) the toxic absorption causes ill-health and frequently persists after the menopause is completed; (6) if the aberration of the menopause or the toxic effects are severe, treatment by total hysterectomy is indicated to prevent permanent damage to the future health.

ROSS MITCHELL

**The Passage of Sperms and Eggs through the Oviducts of the Rabbit and of the Human Being, with a Consideration of Sampson's Theory of Hæmorrhagic or Chocolate Cysts.** Parker, G. H., *Am. J. Obst. & Gynec.*, 1932, **23**: 619.

The passage of sperms from the vagina to the ovary appears to be due to muscular activity of the vagina. It is also likely that in rabbits and in human beings the sperms make their way from the vagina into the uterus through their own locomotion, but this form of transfer is scarcely to be regarded as normal. In passing through the uterus sperms seem to depend entirely upon their own locomotion. In the rabbit the passage of sperms through the uterine tube requires about two hours. Experiments with a rabbit's isolated tube kept in Ringer's solution showed that if a small amount of India ink were injected into the cavity of the tube midway of its length, and the preparation allowed to stand for an hour or more, the ink would be found to have approached both ends of the tube or even escaped from them. If a freshly prepared tube is watched closely from the outside no evidence of peristalsis or antiperistalsis will be seen. The muscular movements of the tube are slight and almost exactly like those of segmentation as seen in the vertebrate intestine; the tube constricts at one point and then relaxes, during which time a new constriction is established above and below the old one. It is by this means that sperms and other small particles, such as ink grains, are transported either up or down the tube. The operation is in no wise dependent upon the motility of the particles.

The special transporting facilities of the uterine tubes are determined by the size of the bodies concerned. Small particles, such as ink granules or sperms, are transported either up or down the tube. Large particles of the size of the mammalian egg are carried down the tube only.

In 1921 Sampson advanced the hypothesis that hæmorrhagic or chocolate cysts are growths from live epithelial cells liberated at menstruation from the inner face of the uterus and transported by some means unknown through the uterine tubes to be discharged in the vicinity of the ovary. If the compartment hypothesis is a true statement of the way in which the tubes act it offers a satisfactory explanation of the method by which freed epithelial cells from the uterus can be trans-

ported to the neighbourhood of the ovary, for, since such cells are relatively small, they can be carried by the currents of the compartment system, as the sperms are, to the region of the ovary, where they can attach themselves and grow as a transplant into a cyst.

ROSS MITCHELL

## PÆDIATRICS

**Atelectasis in the New-Born.** Durham, E. C., *Am. J. Dis. Child.*, 1932, **3**: 594.

In the course of a special study of new-born infants six cases of pathological atelectasis were seen in which the diagnosis was confirmed by roentgenograms.

Atelectasis of the new-born is the abnormal persistence of the condition of incomplete expansion of the lungs which is physiological in the first few days of life; it is always secondary to some condition that interferes with the mechanism bringing about full expansion of the lungs. All of the 6 infants in this series were of average or more than average birth-weight. In 4 cases delivery was spontaneous and in 2 cases by operative procedure. Cyanosis was present some time in every case. In 5 cases the respirations were abnormal. In 3 cases the cry was abnormal. Only one infant had a cough. Signs in the lung were found in 4 of the 6 infants. In 2 cases râles were present; in 3 cases there was impairment of the percussion note over a localized area, and in 2 of these the breath sounds were altered over this area, being tubular in one case and diminished in the other. The physical signs varied considerably from time to time. In two instances no physical signs were found, the clinical diagnosis, based on symptoms only, being confirmed by roentgenograms.

Case histories are presented and roentgenograms reproduced. The characteristic roentgenological picture shows patchy or diffuse haziness in one or both lung fields (evidence of incomplete aeration) and also a narrow or cone-shaped thorax, with the ribs forming an acute rather than a right angle with the spine (evidence of incomplete expansion of the lungs). In films showing unilateral increased densities the diaphragm may be elevated homolaterally. All were treated by inhalations of five per cent carbon dioxide in oxygen. Five were discharged in good condition; one died. With the disappearance of the atelectasis the roentgenogram shows relatively clear lung fields, a widening of the thorax with a tendency to assume the barrel shape, and elevation of the ribs so that they form nearly a right angle with the spine. The exposures were made with the infant held in the erect posture. Several pictures were taken in each case in inspiratory and expiratory phases, and comparison of films was of course made only between films taken in the same respiratory phase.

The author concludes that roentgenographic examination of the lungs is always indicated when a new-born infant is cyanotic.

A. K. GEDDES

**Non-Rachitic Soft Chest and Flat Head: A New Syndrome.** Hess, A. F., *Am. J. Dis. Child.*, 1931, **41**: 1309.

In 1924 Hess reported (under the title "Non-rachitic Softening of the Ribs in Infants and Children") a condition of abnormal pliability or lack of resistance of the wall of the chest in non-rachitic children. Significant features were: beading of the ribs was absent; roentgenograms of the epiphyses at the wrists showed no abnormality; blood calcium and phosphorus values were normal; the condition showed no seasonal incidence; the prolonged use of all the specific antirachitic agents absolutely failed to strengthen the ribs or to lessen the abnormal yielding of the thoracic wall.

In the present paper Hess presents the results of his study of this condition in the ten-year period since it was first noted. He has found, as before, that the syndrome occurs in 5 to 10 per cent of children under 2 or 3 years of age. Antirachitic agents, including full doses of viosterol, have failed to influence it. As the child grows older the abnormal softening of the ribs results in a sinking or flattening of the wall of the chest. With obstruction to respiration, as by large adenoids, pigeon-breast may develop, rather than flat chest. Bowing of the legs and flat feet are frequently associated. The most striking associated deformity, however, is flattening of the skull, generally involving the occipital region.

Two children showing the syndrome came to necropsy. The chest walls were soft; the ribs showed an ash content 20 per cent below normal, indicating some degree of osteoporosis; histological examination thoroughly confirmed the absence of rickets.

The flat head is explained as the result of pressure from without on a skull softer than normal; some degree of the deformity may persist into late childhood. The flat chest is the result of external pressures on yielding bone—the dorsal position of the infant, the action of gravity, and the relatively inactive respiratory apparatus. The chest deformity is seen to persist into late childhood. Hess believes that many of the flat chests seen in childhood, or later, are due to this pathological condition of osteoporosis and should not be ascribed in a routine way to early rickets or marasmus. The syndrome—flat head and soft chest—does not belong in the category of rickets and should be differentiated from that

disorder. It is a form of osteoporosis, the origins of which must date back into fetal life.

A. K. GEDDES

**Asymmetry of the Head and Face in Infants and Children.** Greene, D., *Am. J. Dis. Child.*, 1931, **41**: 1317.

This is a companion paper to Hess's "Non-rachitic Soft Chest and Flat Head; A New Syndrome," abstracted above. In it a study of the cranial asymmetries in infancy is reported. In the institution in which he worked—a home for infants—Greene found that about 10 per cent of the children showed the condition (asymmetry of the new-born is of course excluded). Cranial measurements were made with a lead tape, the shape of the tape reproduced on paper, and comparison made with similar diagrams after treatment of the condition by change of posture. The asymmetry of the skull is accompanied by an asymmetry of the face, leading to an increased height of one malar bone and a difference in the level of the ears. Sometimes an irregularity of the dental arches and a lateral deviation of the nose also results. This deformity of the skull is due to the almost constant pressure on the bones of the head incidental to the posture of the infant. The condition may result from rickets, but in Greene's cases rickets was shown to be absent by all the usual criteria. He regards the condition—flat head or flat occiput with facial asymmetry—as most frequently the result of an osteoporosis of the cranial bones, and essentially a part of the symptom-complex that includes softening of the ribs and of some of the long bones of the body. Change of the infant's posture readily corrects the condition. The deformity, if untreated, may persist into childhood and apparently even into adult life.

A. K. GEDDES

## ORTHOPÆDICS

**Sympathetic Ganglionectomy and Trunk Resection in Arthritis: Indications and Results.** Henderson, M. S. and Adson, A. W., *J. Bone & Joint Surg.*, 1932, **14**: 26.

This study concerns a group of arthritic patients with cold, clammy, pale or cyanotic extremities, (*i.e.*, vasomotor phenomena). The application of heat causes an improved circulation; sympathectomy does the same to a greater extent. Cases subjected to operation have been young adults suffering from chronic non-specific infectious arthritis, also called rheumatoid, atrophic and proliferative arthritis. Sympathectomy has not been done to relieve ankylosis nor attempted in the presence of active infection. At the same time it is to be realized that persistent conservatism may not only be useless but costly to the patient, by permitting the formation of pathological joint changes. Brown's vascular studies have shown changes in cutaneous temperature due to the administration of foreign protein. The degree of vascular spasm has been determined by comparing the temperature of the mouth and skin before and during the height of the fever caused by the foreign protein. Unless the increase in the temperature of the skin was two or more times the increase in the mouth temperature little was to be accomplished by sympathetic ganglionectomy and trunk resection. The operation affords the greatest amount of relief in the smaller joints of the extremities—fingers, hands, wrists, toes, feet and ankles. It is of little use in knees, hips, shoulders and spine.

J. A. NUTTER

**Flat Foot.** Forrester-Brown, M., *Brit. M. J.*, 1932, **1**: 463.

The term "flat foot" is commonly applied to a variety of conditions and is definitely a misnomer. "Incompetent feet" would be a preferable term. An anatomically sound foot may become functionally incompetent under the influence of: (1) toxins of acute illness or chronic sepsis; (2) lack of oxygen; (3) excessive heat (stokers); (4) excessive cold, local or general; (5) general fatigue; and (6) malnutrition, local or general. More direct causes are poliomyelitis affecting the tibialis anticus and posticus, and spastic paralysis. No patient should get up after an illness and walk about in bedroom slippers. A firm boot or shoe which laces should be worn.

The functions of a normal foot are weight-bearing, provision of springing to reduce jars, and to act as a pivot to assist in turning. A complaint of incompetent feet demands a general examination. Thus a markedly overweight patient may get relief when his weight has been reduced. A corn or dirty mark on each internal malleolus is a sure sign of a valgus position of the heel. A corn under the head of the first metatarsal indicates faulty stance, as this part normally should not touch the ground. Hallux valgus usually results from wearing too short stockings or shoes. Corns under the heads of the metatarsals indicate dropping of these heads. Treatment attempts to remove the reason for the deformity and to prevent its recurrence. Strapping may be used to support the heads of the metatarsals, or a felt pad worn beneath them. Ample toe-room should be present in the shoes. Exercises such as picking up marbles with the toes and heel-toe walking are useful. Valgus of the heel is treated by an inside wedge. This wedge is added to the sole under the first metatarsal head. Strap shoes or sandals should not be worn. Hallux valgus requires operative treatment.

STUART D. GORDON

## OPHTHALMOLOGY

**Brain Abscess.** Coleman, C. C., *J. Am. M. Ass.*, 1930, **95**: 568.

In this paper Coleman reviews 28 cases of brain abscess, and comments on the ocular findings. Abscess of the brain originates from septic encephalitis, and is not considered amenable to surgical treatment until encapsulation of the abscess has taken place. Many of the symptoms after encapsulation, as well as the results of treatment, will depend either upon the persistence of the original encephalitis, or on a recrudescence of the condition. The mild disturbances of the so-called latent stage of many abscesses may be explained by the disappearance of the diffuse inflammation that characterizes the stage of development and capsule formation.

Successful treatment of brain abscess depends largely on the removal of the localized infection without the production of an extensive encephalitis. A diagnosis of brain abscess is rarely made in the first stage, but assistance in diagnosis after encapsulation may be found in the history of a previous mastoid or paranasal infection. When the intracranial complications persist, or increase, after these infections have been dealt with surgically, there is reason to suspect the presence of an abscess of the brain. Papillœdema was found to occur with about the same frequency in brain abscess as in brain tumour. Occasionally there are no optic nerve changes in brain abscess, whether situated in the frontal lobe, the temporal lobe, or in the cerebellum. This was the case in 10 of the author's 28 cases.

There appears to be no definite relation between the size of the abscess and the degree of papillœdema. The greatest elevation of the disc was found with the smallest abscesses, while there were no disc changes in the largest abscess of the series. A satisfactory study of the field of vision was made only in 9 cases, owing to the inability of the patient to cooperate. Quadrantic defects of the fields in temporal lobe abscesses should be found as often as in tumours in the same situation, were it not for the stuporous condition of most patients. There is still much difference of opinion as to the best method of treating an encapsulated abscess. The most dangerous type is the thickly encapsulated and deeply seated small abscess. Subtemporal decompression should be done at the same time as the tapping operation in view of the probable rise of intracranial pressure. Macewen from his large experience of brain abscess regarded it as one of the most favourable of cerebral lesions.

S. HANFORD MCKEE

**Diseases of the Lachrymal Apparatus.** Meller, J., *Trans. Ophthal. Soc. U.K.*, 1929, **49**: 233.

Meller, in the opening paper at the Ophthalmological Congress, discussed the methods of treating diseases of the lachrymal apparatus, particularly dacryocystitis. He described the treatment of introducing into the lachrymal sac silver nitrate, 0.25 per cent, albargin, 0.25 to 0.75 per cent; optochin, 1 per cent; and oxycyanate salve. Silver nitrate is contraindicated when ulceration, obstruction of the lachrymal duct, and inadequate drainage are present. Optochin salve is of value in pneumococcal infections of the lachrymal sac. When iodine injections are used the sac is first cleansed by saline irrigations. Potassium iodide, 10 per cent, is introduced into the sac and followed by a very small quantity of hydrogen peroxide. Swabs are placed over the puncta to prevent regurgitation, and finally the sac is syringed through with distilled water. Meller states that with these methods a cure is by no means certain.

Three methods of surgical treatment of chronic dacryocystitis are given. Meller recommends extirpation of the lachrymal sac when pus is present, when an intraocular operation is to take place, and when the lachrymal sac is tuberculous. A detailed account of dacryo-cysto-rhinostomy and its modifications, as practised by Toti, Dupuy Dutemps and Marquez, are given. He mentions that concussion has followed violent chiselling. Later complications are suppuration in the canaliculi, granulation tissue and cicatrization, blocking the site of an anastomosis between the nasal mucosa and the lachrymal sac, surgical emphysema. The treatment of acute purulent dacryocystitis must be governed by the condition of the tissues in the vicinity of the lachrymal sac. When there is no clinical evidence of softening or infection of the tissues around the sac, conservative measures are indicated. When the surrounding tissues are infected, Meller advises incision and drainage, followed later by radical dacryocystectomy and excision of a fistula, if such is present. He describes the value of radiographic examination after the injection of 40 per cent lipiodol, and emphasizes the importance of a thorough investigation of the nose for lesions that may cause epiphora by reflex irritation.

S. HANFORD MCKEE

## NEUROLOGY AND PSYCHIATRY

**Tonic Pupils and Absent Tendon Reflexes.** Adie, W. J., *Brain*, part 1, 1932, **55**: 98.

The author discusses 19 cases of the above mentioned associated clinical disorders in which he is satisfied that syphilis was not a factor. In addition to cases under his own

observation, he has found records of 44 others, published in ophthalmological literature for the most part.

He describes both complete and incomplete forms, the former characterized by tonic pupils and absence of one or more tendon reflexes. The incomplete forms have either of these abnormalities alone. The tonic pupils are held to differ distinctly from the Argyll-Robertson pupil in that they are only apparently inactive to light. After a sojourn in the dark, these tonic pupils slowly dilate, will then slowly contract on exposure to bright diffuse light, and on convergence contract slowly, at times to an extent greatly in access of normal. The reaction to mydriatics and myotics is normal, and in over half the cases the tonic pupillary phenomenon was unilateral. Some variation was noted also when repeated examinations were made at different times. As for the tendon reflexes, loss of one or both ankle-jerks was most often noted. The arm-jerks may disappear, with the knee-jerks still present, although sluggish.

Males are more frequently affected than females. Occasional mistiness of vision may be complained of, but no evidence of disturbance of muscle or nerve function seems to accompany the areflexia. Syphilis plays absolutely no part. The greatest care must be taken during examination to avoid overlooking the peculiar characteristics of these pupils. The explanation offered is that the phenomena are a manifestation of disorder of the vegetative nervous system—"a kind of perversion of nervous activity of which at present we can form no conception."

A. T. MATHERS

**Spinal Fluid in Hypertension.** Shelburne, Blain and O'Hare, *J. Clin. Investigation*, 1932, **11**: 489.

The disturbing effect of lumbar puncture in a patient with headache, hypertension and eye-ground changes, prompted this investigation. Not every case of hypertension has increased intracranial pressure, and some means of detecting increased pressure without lumbar puncture is desirable. A series of 50 cases of hypertensive disease was studied, repeated blood pressure readings, examinations of the spinal fluid and eye grounds made, and in about half the cases roentgenograms of the skull taken.

Twenty-one cases had increased intracranial pressure and these almost always exhibited papilloedema, especially in cases with renal failure. Headache was found to be more frequent in these cases, but it was concluded that lumbar puncture is not justified. The increased intracranial pressure seemed more often associated with high diastolic pressure, but it was considered that both were due to some common factor and neither caused by the other.

A. T. MATHERS

**Suicide—Some Danger Signals.** Fairbank, R. E., *J. Am. M. Ass.*, 1932, **98**: 1711.

A study of 100 cases of suicidal attempt was made at the suggestion of Adolf Meyer. A brief summary of the history and subject is given. Of the 100 cases reviewed, 47 were women and 53 men, and in these, the mental reaction type present was depression in 73 per cent, paranoid states, psychopathic personality, general paresis, epilepsy, chronic invalidism, and recurrent manic excitement being represented by comparatively small ratios. The apparent motive in most of the cases was a feeling of failure or frustration, although fear of insanity was also prominent, especially in cases with a family history of mental disorder. An attempt to escape from delusional persecutions or actual situations of a difficult nature was common in the group, whilst family histories of suicides, depressions and alcoholisms occurred frequently enough to be noted. The method resorted to varied a great deal, but the influence of newspaper reports in setting a "style" was manifest.

Among danger signals noted were previous attempts, frequent talking about suicide, obvious tenseness, attempting to pull away from attendants when being conducted, overeagerness to join in activities outside the ward. The special dangers of the convalescent period are stressed and some of the special tricks resorted to by patients are described.

A. T. MATHERS

**Head Injuries: Effects and Their Appraisal. IV. Evaluation of Evidence.** Dennedy, F., *Arch. Neurol. & Psychiat.*, 1932, **27**: 811.

Deformities in the brain resulting from scars may be well demonstrated by encephalograms. Such deformity does not necessarily occasion abnormal function. Further, complete symmetry of the ventricles cannot be postulated as constant before injury, as cerebral distortion can occur without symptoms in other diseases.

In evaluating head injury cases one must be satisfied regarding the adequacy of injury, the immediate manifestations, and the validity of those of later origin. The cases most difficult to appraise are those presenting only subjective symptoms—the "post-traumatic general cerebral syndrome." To estimate the organic disability in a particular case one must have certain criteria.

A. Absolute criteria:— (1) roentgen evidence —skull fracture; (2) bloody spinal fluid; (3) bleeding from the orifices—especially from the ears; (4) focal cerebral palsies.

B. Presumptive criteria, in the order of their importance:— (5) convulsive states, proved to be post-traumatic; (6) ventricular distortion,

proved to be post-traumatic; (7) a history of prolonged unconsciousness; (8) a history of adequate trauma, with especial consideration of the occurrence of vomiting following the injury.

If the headache and dizziness persist for more than four months in a man under 60, ununited to any of the first seven premises of brain injury, they are to be regarded as suggested neuroses unfounded in structural change.

FRANK A. TURNBULL

## PATHOLOGY AND EXPERIMENTAL MEDICINE

**The Significance of the Bargen Organism as an Etiological Factor in Ulcerative Colitis.** Rafsky, H. A. and Manheims, P. J., *Am. J. M. Sci.*, 1932, **183**: 252.

The authors have investigated the question of the specificity of the Gram-positive diplococcus of Bargen as the cause of ulcerative colitis. They studied the stools and proctoscopic scrapings in a group of 314 patients suffering from a variety of conditions. About 20 per cent of the cultures were from material obtained by proctoscopic examination, and the remainder directly from fæces. Cultures were made of the stomach contents in four instances and of the duodenal contents in one case. Bargen's cultural technique was followed. The results were as follows. In 30 cases of ulcerative colitis cultures obtained from proctoscopic scrapings showed Bargen's diplococcus only twice. From 111 cases of spastic colitis this organism was never isolated from the fæces in a total of 89 cultures and only twice in 22 proctoscopic cultures. In the group of 173 miscellaneous cases, Bargen's diplococcus was recovered once from 132 fæces cultures and not at all from 36 proctoscopic cultures. It was recovered once from the 4 stomach cultures. The authors therefore consider the organism to be unimportant in the etiology of colitis. They caution against considering every Gram-positive lancet-shaped diplococcus found in the colon to be a Bargen organism. Fermentation reactions and, more important, the heat resistance test, must be employed before identification can be made.

E. S. MILLS

**Further Studies on Experimental Work on Probable Causes of Prostatic Hypertrophy.** Lower, W. E. and Johnston, R. L., *J. Urol.*, 1931, **26**: 599.

It has been shown that in many animals the pituitary gland enlarges after castration, and the opinion has been advanced that the pituitary is normally held in check by the gonads and when this inhibition is removed it manifests increased activity leading to altered metabolism. On the contrary, if an excess of anterior pituitary gonad stimulating hormone is introduced into the circulation a stimulating effect is produced on the testes as well as on the prostate and seminal vesicles. In other words, the maintenance of a normal prostate is dependent upon a testis which produces a normal amount of male hormone. A testis which is damaged, or its tubules degenerated, instead of producing atrophy of the prostate will likely produce an hyperplasia. An interesting observation has been made that if rats are given a manganese-free diet the sex glands of the males degenerate until sterility results. The females continue to have litters but refuse to foster their young. The addition of a very small amount of manganese restores the animals to a normal condition. Loss of the testes is followed by atrophy of the prostate and vesicles.

A series of experiments were carried out in rats and also in dogs to determine the effect of radium and also x-ray radiation of the testes. In all instances small doses of radiation caused tubular degeneration, with a corresponding increase in interstitial tissue and a tendency to further increase in the size of the accessory sex glands. Large doses not only damage the tubules but also depress the hormone-producing function of the testes. X-ray treatment for hypertrophy of the prostate is unsound, because through indirect means stray rays might come in contact with the testes and produce tubular degeneration, which would stimulate the further development of the prostate. All findings are consistent with the idea that the simple glandular type of hypertrophy of the prostate may arise from an excessive action of the anterior pituitary. The mechanism which brings about this overactivity is probably due to degeneration of the testicular tubules. It is the authors' hope that certain simple glandular hypertrophies of the prostate which have not passed into the fibrotic stage might be benefited by suppression of the male hormone or by suppression of the anterior pituitary gonad-stimulating hormone which regulates the production of the male hormone.

N. E. BERRY

## HYGIENE AND PUBLIC HEALTH

**Incidence of Tuberculosis in the Industrial Population.** Dublin, L. J., *J. Am. Pub. Health Ass.*, 1932, **22**: 281.

The industrial policy holders of the Metropolitan Life Insurance Company are those who carry less than $1,000 insurance and pay their premiums on a weekly basis. They are for the most part wage-earners and may be considered as fairly representative of the industrial population of the United States and Canada. In 1930 the death rate for tuberculosis in this group was 81.3 per 100,000. The death rate for the ordinary policy holders, that is to say those

carrying policies of $1,000 or more, was only 48.7 for 100,000 and for those carrying policies of $5,000 and over the death rate for this disease was 17 per 100,000. Evidently tuberculosis is a disease of the lower economic groups. Despite the apparently high tuberculosis death rate of this group the improvement during the last 20 years has been astonishing. As an example, in 1911 the death rate of white male industrial policy holders in the age group 35 to 44 was 606.1 per 100,000. In 1930 it was less than one-quarter, namely, 141.0 for 100,000 Other age groups show similar striking reductions. Detailed tables are given of the death rates in all age groups for both sexes and for white and coloured.

The comparison of the figures of the sexes is of interest. Generally females enjoy a lower death rate from tuberculosis than males. But in the period from 10 years to 25 years of age the female death rate is significantly higher. Thereafter it is much lower. For example in 1930 the death rate for white males aged 15 to 19 was 34.3; for white females in the same age group it was 69.5. In the age group 45 to 54 the period of greatest mortality in the male death rate was 177.2, whereas the female rate was only 57.1. The coloured rate is consistently higher than the white. In 1930 coloured males aged 20 to 24 had a death rate of 351.5—more than 4 times the rate for white males. Apart from age and sex, occupation plays an important part in tuberculosis. The highest death-rates for the disease are found among those exposed to siliceous dust. Cigar and textile workers, shoe factory operators, barbers and laundry workers appear to suffer an excessive mortality from tuberculosis. The tuberculosis death rate among industrial policy holders in Canada is definitely higher than in the United States. On examination however, the increase is due apparently to the excessive rates in Quebec, Nova Scotia and New Brunswick. Elsewhere the Dominion's record compares favourably with the United States.

This study lends statistical support to the belief that tuberculosis is an important disease to the industrial hygienist. In the aggregate it probably causes less economic loss than the common cold, but as a killing disease it is undoubtedly the greatest problem in industrial medicine, overshadowing all other diseases, like lead poisoning which occupy a good part of the attention of students of industrial health.

FRANK G. PEDLEY

## RADIOLOGY

**Post-Operative Roentgen Therapy for Cancer of the Breast.** Portman, U. V., *Am. J. Roentgenol.*, 1932, **27**: 513.

Whereas carcinoma of the breast has always been looked upon as primarily a surgical problem, it is very questionable whether malignant disease can be completely eliminated when the axilla is involved. It is certain that the operation is of little value to the patient as far as cure is concerned when neoplastic cells remain. Reviewing reports of statistical studies, it is seen that about 30 per cent of patients are free from manifestation of disease for five years after operation. Radiologists cannot reasonably expect favourable results in every instance, yet there is no basis on which we can determine which cases will be benefited without a trial in each case.

Limiting this paper to post-operative roentgen therapy, a report is presented of 103 consecutive patients who were operated upon and received immediate post-operative roentgen therapy between the years 1922-1925. Each case had microscopic confirmation of the diagnosis. Ten patients of this series died of diseases which were proved not to be cancer. The cases were grouped according to extent of involvement: (1) those free from axillary involvement as reported by pathologist; (2) those with axillary involvement, minimum skin involvement and tumours were movable; (3) those more advanced but which were considered surgically operable. In group one 77.8 per cent are now free from cancer. In group two 61 per cent lived five or more years and 56.3 per cent were now free from disease. In group three 84.4 per cent died of cancer and only 18.7 per cent lived five years. By averaging the three groups, it is found that 50.5 per cent lived five or more years and 42.7 per cent were free from disease for five or more years. Following operation alone not more than 30 per cent of cases were free from disease after five years. In this series, with operation followed by roentgen therapy, the percentage is almost 43 per cent. This would indicate that there is some advantage to be gained by this procedure.

A. S. KIRKLAND

**Whither the Radiologist?** Richards, C. M., *Radiology*, 1932, **18**: 394.

The status of the specialty of radiology has been of the greatest concern to many of the outstanding practitioners of the specialty all over the country. "Is radiology moving toward complete recognition as one of the most highly specialized branches of medicine and surgery, or is it being hampered in its progress by certain conditions and influences which have been ignored or disregarded too long?" This question involves the radiologist in private practice as well as in the hospital. Radiology is a relatively youthful science and rapid strides are being made, both in new and valuable diagnostic methods and in increased accuracy and efficiency of therapeutic dosage. It is most necessary that

this young specialty be made to occupy the dignified relation to the general medical profession and public which its importance warrants. Outside influences which appear unfriendly to this specialty include the medical practice laws which allow beauty parlors, shoe stores, laymen, chiropractors and all sorts of quacks to use the roentgenray at will, whereas the prescription of simple drugs is carefully guarded by laws governing the right to practise medicine. These laws must be changed. An injustice has been done, perhaps unintentionally, by the salesmen of x-ray apparatus. These salesmen sell x-ray equipment to regular practitioners of medicine and to the quack alike, with the assurance that the machines may be operated with no need of specialized training and with the hope of large financial returns. The difficulty of handling out-of-the-ordinary cases, to say nothing of the pitfalls of x-ray interpretations, are not stressed to the same degree by the salesman. The added overhead and running expenses, extra hazards, increased insurance rates, and wasted time gradually inform the general practitioner who attempts x-ray work on his own that he is the owner of a white elephant.

The practice of giving a patient his films encourages the idea that the x-ray fee pays for films instead of for a medical opinion, and exposes the patient to the injustice of having his films diagnosed by an unqualified person, in some instances thus leading to unnecessary and even dangerous treatment. Some compensation insurance companies even go so far as to pay the radiologist according to the number and size of films used. The lay x-ray laboratory is the most serious blot on the science of radiology. Its existence is due to lax medical laws and the short-sighted, selfish attitude of a certain section of the medical profession. A variation of this type is the so-called co-operative x-ray laboratory which rebates a portion of the x-ray fee to the referring physician.

The problem of the x-ray technician is sometimes difficult. The value of his work has been recognized by the organization of the Registry of Radiological Technicians. The physician practising radiology should not turn his patients over entirely to his lay assistant. Each patient should be seen and examined by the radiologist, and he should be able to discuss the case with the referring clinician on a basis of equality along clinical lines. To do this the radiologist must keep clinically alive and deserve the description of "a physician practising radiology".

A. STANLEY KIRKLAND

# Obituaries

**Dr. James Donald,** of Cowley, Alberta, died after a short illness, on May 14, 1932. He graduated from Glasgow University in 1881 and settled in Alberta in 1908. After a few years of practice at Lunbreck he moved to Cowley where he practised until the time of his death. He was highly esteemed in the district in which he worked.

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**Dr. Solomon Matthews Dorland.** Western Ontario lost a pioneer medical practitioner on May 29, 1932, in the death of Dr. S. M. Dorland, of Rodney, Ont., aged 83 years. He had practised in Rodney since 1885 and for more than forty years was Medical Officer of Health for Aldborough Township. Born in Sophiasburg, Prince Edward County, Doctor Dorland started teaching school at the age of 18 years, continuing until 1873, when he entered the Provincial Normal School at Toronto. Among his classmates were "Fighting Joe" Martin, formerly Attorney-General of Manitoba and Premier of British Columbia and Robert Barr ("Luke Sharpe").

In 1775 Doctor Dorland was appointed headmaster of the new Central School in Cobourg, and in 1876 assistant master in the Provincial Model School, Toronto, where he remained until 1884. In 1884 he received his M.D. from Trinity University. Later he went to Edinburgh and received the degree of L.R.C.P. Doctor Dorland was active in community life in Rodney and Aldborough Township. He was Chairman of the Rodney Board of Education for ten years. He was a direct descendant of Jan Garrettsee Dorland, a Hollander who settled in Long Island, N.Y., in 1652.

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**Dr. Walter Murray English** died on May 18, 1932, in Oxford, England, whither he went last December to reside for the winter. Although he did not enjoy perfect health no serious results had been anticipated.

Born in Middlesex County 70 years ago, the son of Rev. Franklin English, he attended the London public and high schools and later went to Victoria College, Toronto, graduating in 1886. Following a post-graduate course in England, he practised medicine at London, Ont., and was lecturer in Western University for some time, and also Chairman of the Board of Education.

The late Doctor English had been in the service of the government for 25 years and was well known throughout the province. He was formerly Superintendent of the Ontario Hospital at Hamilton, Ont., and after 1927, was Superintendent of the Institution at Brockville. He was superannuated about a year ago.

Doctor English was a Past-president of the Ontario Neuro-psychiatric Association and in 1930 was elected President of the American Psychiatric Association.

He is survived by his widow a daughter of the late Sherrif Clark of Port Arthur; two sons, Walter R. English of Gowanda, N.Y., and Harold F. English of Chicago; and four sisters, Mrs. H. Gerrens, of Oxford, England, Mrs. Sage and Miss F. H. English of London, Ont., and Mrs. Corvin Weld, Vancouver. The funeral service was held in Oxford and the body was cremated and sent to Canada.

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**Dr. Weldon Palmer Kirby,** of Moncton, N.B., died in the City Hospital there on May 22nd, the result of a paralytic stroke suffered during the course of an operation the previous Sunday. Doctor Kirby was fifty years of age and was the son of the Rev. W. J. Kirby and Mrs. Kirby, of Moncton. He was born at Bayfield on March 20, 1882, and received his early education at the high school at Charlottetown. Following this, he entered Prince of Wales College there.

He later received a Bachelor of Arts degree from Mount Allison in 1904. He graduated in Medicine from McGill in 1908 and started practice in Elgin, Albert County. For the last twelve years, Doctor Kirby has been practising in Moncton. He was a member of the American College of Surgeons and was recognized as one of the most successful and efficient surgeons in Moncton. Doctor Kirby is survived by his wife and two sons.

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**Dr. John A. Macdonald**, of Vancouver, B.C., passed away on April 28, 1932, at the age of seventy. He will be well remembered in Manitoba, where he formerly practised at Brandon.

Doctor Macdonald was born at St. Catharines, Ont., and graduated from Trinity Medical College, Toronto, in 1881, at the age of nineteen. From Toronto he proceeded to Edinburgh, and took his L.R.C.P. degree. Returning to Canada in 1884, he commenced practice at Brandon, Man., and became a leader in professional and social activities. His training and interests led him into public health work, and he was at various times City Health Officer of Brandon, a member of the Provincial Board of Health of Manitoba, and, in 1908-09, Vice-president of the American Public Health Association. He was for some years an examiner for the College of Physicians and Surgeons of Manitoba.

Coming to Vancouver in 1909, Doctor Macdonald was active in practice, for a time Medical Officer of the 6th Duke of Connaught's Own Rifles, and an ardent golfer. He was a brother of the Hon. Mr. Justice W. A. Macdonald, of the Supreme Court of British Columbia.

A man of large experience and sound judgment, possessing a shrewd humour, and an unfailing geniality, Doctor Macdonald had come to occupy a particularly happy place in the esteem of his confrères. Another pioneer has left us, and deep regret is universally felt at his passing.

C. H. BASTIN

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**Dr. George Givan Melvin** died at Oakland, Cal., on May 12, 1932, where he had been spending his furlough with his daughter, Dr. Georgina Melvin.

Doctor Melvin was born in Saint John, the son of the late Daniel and the late Jane Melvin. He attended the Provincial Normal School and taught in Kings County. His medical studies were completed at the Bellevue Hospital Medical College in New York from which he graduated in 1887. He began private practice at Alma, N.B. Later he took special courses at Edinburgh and began practice in Saint John. Following further post-graduate studies overseas, he specialized in diseases of the skin. In 1911, he was appointed District Health Officer for Saint John. Subsequently he secured a diploma in Public Health from McGill University. He was appointed Chief Medical Officer in 1918 by Dr. W. F. Roberts, who was then Minister of Health. He collaborated with Doctor Roberts in drafting the Public Health Act and devised the present scheme for gathering vital statistics used in the province. His wife, Alice, a sister of Dr. B. A. Marvin, of Moncton, died in May, 1918.

On hearing of Doctor Melvin's death, the press of New Brunswick, and especially his close associates Dr. H. I. Taylor and Dr. Wm. Warwick eulogized their late confrère in the highest possible terms.

A. STANLEY KIRKLAND

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**Dr. Edith M. Ross**, anæsthetist, first of the Winnipeg General Hospital, and later of St. Boniface Hospital, died at her home on May 13th after a prolonged illness. Doctor Ross was educated in Winnipeg and graduated from the Manitoba Medical College in 1913, with the university gold medal. From the time of her graduation she practised as an anæsthetist and in that field was highly successful. She was the granddaughter of Dr. Charlotte Ross, the pioneer woman doctor of western Canada, who practised in Montreal before coming west to join her husband who was a contractor engaged in building the Canadian Pacific Railway. Possessed of a singularly attractive character, Doctor Ross had made many friends and her long illness was bravely borne.

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**Dr. Mabel Pearl Russell**, of Toronto, died on June 6, 1932. She was the youngest daughter of Mrs. Elizabeth A. Russell. Doctor Russell was not in practice. She was M.B. (Toronto, 1922).

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**Dr. George F. Seaborn** died on April 3rd at Westminster Hospital where he had been a patient for several months.

Doctor Seaborn was born in Rawdon, Que., and graduated from Western Ontario University in 1902. He was a son of the late Rev. W. M. Seaborn, who was well known in this city. For many years Doctor Seaborn was associated with the Research Department of the biological laboratories of Parke Davis and Company in Detroit.

Following the outbreak of hostilities, Doctor Seaborn joined the C.A.M.C. and did splendid service with the Shorncliffe Military Hospital under the command of Lieut.-Col. Clifford H. Reason, D.S.O., O.B.E., V.D., with the Canadian engineers in France and, later, on the A.D.M.S. Staff, London, England.

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**Dr. William John Wesley**, of Thornhill, Ont., died on June 6, 1932. He was a graduate of Toronto, (M.B., 1897). Doctor Wesley is survived by his widow, formerly Bertha Myrtle Currey, and two brothers, Dr. Robert W. Wesley, Toronto, and Dr. J. H. Wesley, of Newmarket.

# News Items

## Great Britain

**The East London Children's Hospital.**—On May 13, 1932, Mr. Warren R. Dawson, F.R.S.E., Hon. Librarian to Lloyd's, read a paper to the Medical and Nursing Staff on "Some Episodes in the Care of Sick Children through Sixty Centuries." The Chair was taken by Dr. John D. Rolleston, Editor of the *British Journal of Children's Diseases.* Mr. Dawson said that in Egypt, long before the art of mummification had been learnt, it was the custom to bury the dead in the hot, dry sands of the desert in shallow graves. As the bodies were completely preserved by desiccation, it is possible to examine not only their bones, but also their soft parts, even to ascertain the food they ate by examining the contents of the alimentary canal. In the stomachs of children (never of adults) remains of mice have been found, evidently given as a last resource before death. The mouse is the oldest children's medicine in the world. Dioscorides, the Greek physician, recommends roast mice to stop dribbling at the mouth, and Pliny used cooked mice in the treatment of enuresis. In country boarding schools of the last generation a child who had an accident in his sleep was made to eat a penitential mousepie in the presence of his schoolmates. For long, mice have been a popular remedy against whooping-cough. In Egypt, under the Pharaohs, children must have been extremely healthy. In a land, in which tens of thousands of human remains have been discovered, the bodies of children are rare and rarer still evidences of disease in them. The methods of accouchement were simple, effective, and on the whole hygienic. Children ran about naked in the sun until the age of puberty. Rickets was unknown. In ancient medical

writings little attention was paid to children's diseases. These were believed to be caused by witchcraft or demons and were thus beyond human control.

In spite of all that philosophers and moralists have written about parental affection, until recent times children's lives were cheap. Less than a century ago there was no sanitation worthy of the name. Bathrooms were unknown. Hot water was troublesome to obtain. Washing was a luxury and in the case of children reduced to a minimum. The poor wore the same underwear by day and by night. A baby from the moment of its birth began life with a serious handicap.

The awakening of knowledge in the seventeenth century was to a large extent academic and had little immediate effect on the health or the mortality of the child in England.

The first children's hospital for in-patients in Europe was the Hôpital des Enfants Malades in Paris, founded in 1802. The East London Children's Hospital owes its origin in 1868 to Dr. Nathaniel Heckford, who died of consumption at the age of 29.

Dr. Eric Pritchard, F.R.C.P., Medical Director of the Infants' Hospital; Dr. W. M. Feldman, F.R.S.E.; and Professor Fraser-Harris spoke in the discussion.

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**Sir Henry Wellcome, F.R.S.**—At a meeting of the Royal Society, held recently, Sir Henry S. Wellcome was elected a Fellow of the Society. Sir Henry Wellcome is founder of the Wellcome Bureau of Scientific Research, a governing director of the Wellcome Foundation, founder of the Wellcome Tropical Research Laboratories at Khartoum, and a generous supporter of medical research.

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## Alberta

The first of this year's extra-mural post-graduate tours under the auspices of the Canadian Medical Association grant was made during the first half of the month of April. The lecturers were Prof. A. T. Mathers, Dean, and Dr. P. H. T. Thorlakson, Lecturer in Surgery, Manitoba University. The places visited were Medicine Hat, Lethbridge, Blairmore, Calgary, Drumheller, Stettler, Red Deer, Ponoka, Edmonton and Vegreville.

At Calgary, at the Holy Cross Hospital, Professor Mathers gave a lecture on "Neurosyphilis", with which syphilitic complication he has had long experience. He stated that the classification of specific nervous lesions is based on no single class of cases, either from the anatomical or pathological viewpoint. Infection of the nervous system occurs early. He has seen cases in which such infection developed within two months following the primary sore. This complication should be recognized early and the physician should envisage what the patient may develop five or ten years hence. In recent years the diagnostic technique has been improved. The blood Wassermann test may be negative in treated cases as well as in alcoholics. An increased cell count in the cerebrospinal fluid should be appreciated. The predominating cell is the lymphocyte, in some cases, the polymorphonuclear. The normal lymphocyte count is 7 to 10 cells per c.mm. and more than 10 cells is pathological. From a prognostic standpoint a patient with a high cell count will respond better than one with a low cell count. There are certain diagnostic signs referable to the eyes, such as irregularity in the size of the pupils, impaired sensory reflex to sight, which need no comment, excepting that in disseminated sclerosis and in some cases of encephalitis the same sensory changes may be elicited.

Professor Mathers gave the various types of cerebral involvement as meningeal, vascular and parenchymatous, and reviewed the symptoms produced with involvement of the meninges, at the base and convexity of the brain, and of the nuclei of the optic, the third and the sixth nerves, as well as those associated with the vascular and parenchymatous types.

He classified the types of general paresis as (1) the fuminating, active; (2) the melancholic; (3) the expansive. The treatment of neurosyphilis was thoroughly discussed and the value of tryparsamide emphasized. The good effects of the malarial treatment of general paresis were clearly estimated and some of the bad effects referred to.

Professor Mathers' evening lecture on "Brain tumours," well illustrated by lantern slides, was of much interest. At the present time due to the improved methods of treatment the former attitude of hopelessness in regard to brain tumours has been replaced by one of hopefulness. A knowledge of the anatomy and physiology of the nervous system is essential if a correct diagnosis is to be made. Pathology in the history of disease also contributes to our information, as in encephalitis. When investigating diseases of the nervous system there are certain requirements: (1) the preservation of an objective attitude; (2) taking the history in chronological order; and (3) making a complete physical examination. The incidence of brain tumours is increasing and this has been noted in the Winnipeg General Hospital during the past four years.

In more than 80 per cent of patients, a characteristic type of headache is complained of, with a definite distribution. This headache is due to interference with the cerebrospinal fluid, causing increased intracranial pressure, and is worse during the early part of the night and early in the morning. It is usually frontal or occipital. Vomiting occurs in approximately 54 per cent of cases and is worse when the headache is most severe. In about 50 per cent of cases the vomiting is projectile. In about 53 per cent of cases there are visual disturbances, such as flashes of light, scotoma, hemianopia. In about 39 per cent there will be a history of convulsions over a period up to ten years, due to brain tumour. If a tumour develops with local manifestations it is likely in the so-called "trigger area" and there is thalamic pain, which is unilateral. A cystic tumour most frequently produces convulsions. Mental symptoms such as depression and fears are often present. Vertigo occurs in about 29 per cent of patients, and is either static or dynamic (meaning when the patient is moving about).

The clinical investigation will take into consideration Is there a tumour? Where is it? and What is it? There will be need for repeated examinations and the findings must be checked up. A general physical examination is very important and should be made. Metastases may occur in the brain from a malignant tumour in another part of the body. An examination should be made of the scalp and cranium. Roentgenographic examination is worth while and is a well established procedure. In 20 per cent of brain-tumour cases there will be positive evidence, and in another 20 per cent there will be other signs such, as a general erosion of bone and markings of the convolutions on the skull. Certain types of brain tumour respond to radiotherapeutic measures (about 42 per cent of gliomata, and a megaloblastoma is very responsive). A very dangerous brain tumour of middle life is the spongioblastoma which may cause death in six weeks.

Dr. P. H. T. Thorlakson gave a lecture on "The management of some of the commoner ano-rectal disorders", which was of much practical interest. He dealt fully with the classification of fibrous polypi of the ano-rectal region, dividing these into: (1) fibrous polypi of the rectum, either adenomatous or non-adenomatous; (2) inflammatory polypi of the rectum associated with mucous colitis; (3) fibrous polypi at the ano-cutaneous line. Fistulous tracts commencing superficially to the external sphincter were referred to. In the operative treatment the sphincters do not always have to be divided. Goodsell's rule is a practical guide and should be followed; this is, that the perianal region is bisected by a line

through the middle of the anus and the internal opening of the fistula will be in the mid-line posteriorly. In an anterior fistula the rectal opening will be in the anterior mid-line region of the rectum. The majority of fissures-in-ano are situated in the mid-line posteriorly. Anterior mid-line fissures are seen oftener in women than in men, as there frequently has been a prior laceration of the perineum. There are three types. (1) A true fissure from the onset due to the passage of large hard fæcal masses with a chronic ulceration. Treatment for three weeks with mineral oil, daily washing of the fissure, and the application of silver nitrate, 10 per cent solution should be tried before an operation is performed, which consists in opening wide the tract and draining. (2) Short subcutaneous fissure in the posterior mid-line for which excision should be performed. (3) A special type with multiple radiating superficial cracks which have become infected. Doctor Thorlakson spoke about the value of radiotherapy, in one-third erythema doses, at three sittings.

In rectal surgery he employs spinal anæsthesia using neocain, 50 to 60 mgrm. in 50 c.c. of distilled water. Owing to the small amount used there is only a slight fall in blood pressure and the danger is slight. The rectum should always be examined with a proctoscope, and with the finger to make sure that there is no malignant growth. The adenomatous polypus may be the forerunner of carcinoma, so that cancer of the recto-sigmoid area becomes a preventible disease. The early symptoms of rectal carcinoma should be familiar, and when there is blood in the stools, or other signs, a thorough rectal examination should be made. Carcinoma of the colon is a low grade type of growth and the two-stage operation is the best. Radiotherapy is not satisfactory. In the treatment of hæmorrhoids the injection method is largely supplanting the operative treatment. Dr. Thorlakson uses this in 85 per cent of his cases and the results are satisfactory. He uses a solution of quinine and urea hydrochloride injected interstitially, and not near the mucous membrane, because of the danger of sloughing. The treatment of ischio-rectal infections was also outlined. Numerous lantern slides were shown to illustrate the various lesions.

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The following physicians have recently registered with the College of Physicians and Surgeons of Alberta: Morris Schreiber, Morrisburg; R. Julian Brown, Mundare; Harry T. Mount, Edmonton; B. N. Malo, Edmonton; A. J. Lobsinger, Edmonton; B. J. Barnett, Edmonton.

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The Hon. George Hoadley, Minister of Health, will be chairman of the special legislative committee appointed during the last session of the legislature to inquire into and report at the next session on the whole subject of state medicine. The only physician on this committee of eight is Dr. W. L. Atkinson, of Edmonton.

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The Provincial Department of Health has been gathering information on state medicine from the British Columbia Government, where an investigation on this subject was recently made, and from various European countries where various systems of this nature have been in force. G. E. LEARMONTH

## British Columbia

The final report of the Royal Commission on State Health Insurance and Maternity Benefits has been printed, and copies have been distributed to the profession through the courtesy of the Council of the College of Physicians and Surgeons. While it is true that for the present such legislation is definitely postponed, the report is nevertheless well worth close study. Several alternative plans for sickness benefits and treatment are submitted, the estimated costs to the insured varying from $13.25 to $41.74 per year, according to the scope of the benefits. Costs of professional attention are estimated at $750,934 to $1,918,313 a year, the higher figures including maternity costs. The least comprehensive plan would involve an annual expenditure of $2,075,953, and the most elaborate one, $6,527,849.

Morbidity rates are calculated at approximately 7 days per capita, per year, (including accident risks). This would seem to imply that it was intended to absorb the present Workmen's Compensation Act in the scheme. The estimated cost for medical and surgical treatment would be 66.98 cents per capita, per diem, and was obtained by comparing the known cost in Austria and the average fees for prevalent illnesses in that country with similar fees in British Columbia.

From a perusal of the report it is clear that there is general recognition of the facts that the ordinary wage earner is unable to pay for adequate medical care that this should be available to him; and that doctors and hospitals should be paid for such services. Provision is contemplated for such essential features as free choice of doctor, specialist and consultation services, and technical diagnostic aids. Even the most jealous critic will fail to find any suggestion of an attempt to exploit the medical profession.

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The post-graduate course, under the auspices of the Canadian Medical Association, made possible by the generosity of the Sun Life Assurance Company, has just been concluded, the speakers being Dr. A. Gibson, of Winnipeg, Dr. E. L. Pope, of Edmonton, and at some of the meetings, Dr. J. W. Thomson, of Vancouver.

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At the examinations for registered nurses, held recently, one hundred and forty-two candidates were successful in obtaining certificates. C. H. BASTIN

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## New Brunswick

The trustees of the James H. Dunn Memorial Hospital at Bathurst have purchased the residence of Hugh McMinn, which adjoins the hospital property at West Bathurst, to provide a nurses' home and to house others of the hospital staff. This purchase will allow sufficient space to accommodate fifteen or more beds, thus placing the hospital in the class having fifty or more beds.

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The Board of Commissioners of the Jordan Memorial Sanatorium recently approved plans for a new building prepared by H. Clare Mott, architect. It is expected that tenders will be called in the course of a few days for construction of the new building.

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Dr. W. F. Roberts has been appointed Supervisor of the Physical Therapy Department of the Saint John General Hospital.

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Dr. C. G. Main, West Saint John, has been confined to his home for some time suffering from an attack of phlebitis.

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Dr. A. B. Walter, Saint John, attended the Institute of Militia Medical Officers at Ottawa representing M.D. No. 7.

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Dr. J. M. Cameron, of Tavistock, Ont., has been appointed Travelling Tuberculosis Diagnostician for the southern portion of New Brunswick. Doctor Cameron succeeds Dr. C. W. MacMillan. The new officer is a graduate of McGill University and has done special work along public health lines.

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At the meeting of the Canadian Public Health Association, held in Toronto the latter part of May, Dr. Wm. Warwick, of Fredericton, was elected President. Hon. Dr. H. I. Taylor, Minister of Health, was appointed Honorary President.

Dr. R. A. Hughes, of Saint John, suffered an attack of acute appendicitis while returning from the funeral of Doctor Kirby at Moncton. He was successfully operated upon and is now convalescing rapidly.

A. STANLEY KIRKLAND

## Nova Scotia

A series of medical lectures has been arranged at different centres in the province. This has been made possible by a grant from the Sun Life Assurance Company, renewed annually for the past five or six years. The aim of these lectures is to give medical practitioners in the country an opportunity of brushing up on recent advances in medicine. The lecture tour comprises two routes: the first, including Amherst, Truro, New Glasgow, and Sydney, conducted by Dr. D. Grant Campbell, of McGill, and Dr. Victor Mader, of Dalhousie University; the second, takes Dr. H. M. Elder, of McGill, and Dr. S. R. Johnston and Dr. S. L. Walker, of Dalhousie University to Bridgewater, Yarmouth, Digby, and Kentville. During the last week in October another tour on similar lines to the present one will be carried out. In September a whole week will be devoted to a Refresher Course at the Victoria General Hospital in Halifax.

At Kentville recently the first demonstration in Nova Scotia of the artificial larynx took place. Dr. J. B. Bogart, a New York surgeon, whose larynx and vocal cords had been removed for a malignant growth, gave a twenty-three minute address before the Valley Medical Society at its annual meeting.

The officers for the coming year were elected at the same meeting, as follows: *President,* Dr. W. R. Dickie, Digby; *Vice-presidents,* Drs. G. R. Forbes, Kentville; L. B. Braine, Annapolis; W. C. Harris, Barton; *Secretary-treasurer,* H. E. B. Kelly, Middleton. Dr. C. A. Beckwith, Kentville, and Dr. Keeler were appointed representatives to the Council of Nova Scotia Medical Board.

The Registered Nurses Association of Nova Scotia held its twenty-third annual meeting at Antigonish on June 2, 1932, and passed some important resolutions. One resolution favoured raising the entrance age to twenty. A second resolution urged that more time be devoted to a course in Household Economics as most candidates for schools of nursing were handicapped in this respect. It was also decided to invite a prominent Canadian nurse to address the next annual meeting. Miss Anne Slattery, R.N., was elected president for next year, and Miss W. J. Gillis was elected recording secretary.

N. B. DREYER

## Ontario

The London Life Insurance Company has made another $1,000 gift to the Medical School, to help finance the special research work.

Dr. A. Bruce Macallum, of London, has been elected a Fellow of the Royal Society of Canada.

The Ottawa Civic Hospital has approved the establishment of an indoor dental clinic, as a subdepartment of the department of surgery.

Dr. T. C. Routley was the guest speaker at the annual banquet of the Medical School Alumni of the University of Western Ontario on May 27th.

The government report on sanatoria, for the year ending October 31st last, states that the average cost per patient per day in the various sanatoria was as follows,— Brant Sanatorium, $1.41; Muskoka Hospital, $2.39; Mountain Sanatorium, $2.03; Queen Alexandra Sanatorium, $2.06; Royal Ottawa Sanatorium, $2.07; Sandwich County, $2.04; The Preventorium, Toronto, $2.05; Toronto and Queen Mary Hospital for Consumptives, $2.20.

At the twenty-fifth annual meeting of the Academy of Medicine, Toronto, two of the oldest members, Dr. N. A. Powell and Dr. John Ferguson, were presented with certificates of honorary fellowship.

Dr. Goldwin W. Howland, neurologist, attending physician on the staff of Toronto General Hospital, has been awarded the honorary Fellowship of the Royal College of Physicians of London, England. Only two other Toronto physicians have been similarly honoured.

J. H. ELLIOTT

## Quebec

The annual meeting of the Laurentian Sanatorium Association was held in Montreal on May 27th. Dr. J. Roddick Byers, the admitting officer, stated that there were at least 10,000 tuberculous persons in Montreal and that only 181 patients could be admitted to the sanatorium last year out of 339 applicants. He emphasized that the number of public beds available was utterly inadequate in this province and that there is inadequate prevention and rehabilitation work in connection with tuberculosis.

Doctor Byers pointed out that the real cure for the disease lay in prevention, and that in Saskatchewan the death rate had been reduced from 160 per 100,000 of population to but 40 in five years of organized effort. A Massachusetts city had reduced the rate from 180 to 28 through similar measures. He also stated that there should be more provision for the rehabilitation of patients cured from the disease, as now they are sent back to their old and unhealthy environments when still weak.

The treasurer's report showed expenditures of $176,295 against revenues of $135,523. A promised $25,000 grant from the provincial treasury will, however, reduce the 1931 deficit to $15,772.

The average daily number of patients during the past year was 207 as compared with 225 in 1930. Revenues received from private patients were $45,697, or $14,577 less than in 1930. Revenues from the government for treating indigent patients at $1.34 a day came to $86,245, a reduction of $1,467 when compared with the preceding year. Actual daily per capita costs were $2,325, slightly reduced from $2.38 cost of 1930, but considerably more than the government grant. The accumulated deficit now is $140,000, and in view of this and other circumstances the building of a nurses' home will have to be deferred.

In spite of adverse financial conditions, the financial report states that the medical directors are obliged again to insist on the pressing need of an infirmary of modern construction for at least 50 beds.

## Saskatchewan

At the monthly staff meeting of the Grey Nuns' Hospital Dr. L. Roy presented a case of osteogenic sarcoma of the tibia in a man who had been in hospital six months ago but had refused amputation; a biopsy had been made at that time. He returned with another growth lower down on the bone. This time he consented to an amputation which is to be done shortly. Dr. D. Sweeny presented a case of a girl of 20 who had had a discharging empyema for eleven years. A thoracoplasty had been done in two stages. Healing did not occur, but later a graft consisting of skin and muscle was put in. There was a great improvement in the local condition and also in the girl's general health. Dr. D. S. Johnstone presented a case of Pott's disease in

an Indian child aged two years. There was much destruction of the body of the second lumbar vertebra.

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Dr. J. D. McEachern and Dr. A. M. Davidson, of Winnipeg, toured Saskatchewan as the first post-graduate team of the year. At Regina a skin clinic was held in the morning at the General Hospital. About 40 cases were seen by Doctor Davidson, who made the diagnosis and outlined the treatment in a very expeditious fashion. Doctor McEachern gave an illustrated talk on cleft palate. In the evening following a dinner at the Parliament Buildings which was attended by about fifty members, Doctor McEachern spoke on "Empyema" and Doctor Davidson on "Dermatology."

The Red Cross has opened an outpost hospital at Loon Lake, forty miles from the railway. The hospital contains three wards of two beds each, a nursery, bathroom and kitchen as well as quarters for the nurse. The laundry is situated in a separate log building. Dr. W. P. Neufeld was sent by the government to this northern community to care for men in the relief camps and for other illness in the community, but his term expired on May 1st. During the first two weeks that the hospital was opened there were three maternity cases, two appendectomies, one case of pernicious anæmia, on case of chorea, and four accidents. The hospital is of log construction and was built by the provincial government as a relief work. The furniture and equipm was furnished by the Red Cross. LILLIAN A. CHASE

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## United States

**Medical College of Virginia.**—The Carnegie Corporation, New York City, has made an appropriation of 10,000.00 toward the maintenance of the library of the Medical College of Virginia, which will this summer be housed in a handsome new building. Adjoining the new library of the college the Richmond Academy of Medicine has built its home and library. This will contain the famous Joseph L. Miller collection of rare first editions, engravings, silhouettes, medical curios, etc. The headquarters of the Medical Society of Virginia will also be located in the Academy of Medicine building.

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Frank L. Apperly, M.A., M.D., Sc.D., has accepted the professorship of pathology at the Medical College of Virginia, Richmond. Until recently Doctor Apperly was a member of the department of pathology of the University of Melbourne. He was a Rhodes scholar and graduated in medicine at Oxford in 1920. Doctor Apperly has done important scientific work chiefly in pathology, both in Europe and in Australia.

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**University of Southern California.** — Dr. John Mackenzie Brown, of Los Angeles, California, a graduate in medicine of the University of Western Ontario in 1899,, has been appointed professor and chief of the department of laryngology, rhinology and otology at the University of Southern California Medical School.

Dr. Paul S. McKibben, who was dean of the Medical School of Western from 1913 to 1927, is now dean of the Medical School of the University of Southern California.

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## General

**Health Organization of the League of Nations.**—It is desired to bring to the notice of public health administrators the facilities that exist in the Health Organization of the League of Nations for the supply of information relating to the detailed application of different public health methods in various countries. In addition, comparative information is available with regard to epidemiological statistics and public health legislation. The Health Organization is willing to supply, as far as possible, data on the above branches of preventive medicine. Enquiries are however limited to those from the heads of large administrations or the heads of scientific institutions who should indicate the purpose for which the information is required in view of the amount of work that unconsidered requests necessarily involve. Further, enquiries should be limited to information that is not already in the medical press.

All enquiries should be addressed to the Medical Director, Health Section, marked "Public Health Intelligence", League of Nations, Geneva, Switzerland.

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**The International Society of Orthopædic Surgery.**—The Second Congress of the International Society of Orthopædic Surgery will be held in London, Eng., in the premises of the Royal Society of Medicine, from July 19th to 22nd inclusive. The chief topics for discussion will be "The mechanism of articular movements in general," and "The treatment of tuberculous coxitis." There will also be operative clinics in various hospitals. A reception will be tendered the Society by the Royal College of Surgeons.

The General Secretary is Dr. J. Delchef, Rue Montoyer, 34, Brussels, Belgium.

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**The American Board of Otolaryngology.**—An examination was held in New Orleans on May 9, 1932, at which 44 candidates appeared; 37 were passed, 7 failed.

The next examination will be held in Montreal on September 17th, preceding the meeting of the American Academy of Ophthalmology and Otolaryngology. After the Montreal examination the following requirements for examination will be effective:

1. A candidate acceptable for the examination must be a graduate of an approved medical school who has had at least one year of approved interneship or three years of general practice.
2. In addition, a candidate must have completed an academic year as a basic course of otolaryngology or one year of interneship in otolaryngology followed by two years of specialized practice.
3. Five years of specialized practice will be accepted in lieu of the requirements of paragraph two.

Those desiring to appear before this Board should obtain an application blank from the Executive Secretary, Dr. W. P. Wherry, 1500 Medical Arts Bldg., Omaha, Nebraska.

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**The American Board for Ophthalmic Examinations** will hold an examination in Montreal on Monday, September 19, 1932, at the time of the meeting of the American Medical Association. Necessary applications for this can be procured from the Secretary, Dr. William H. Wilder, 122 South Michigan Avenue, Chicago, Ill., and should be sent to him at least sixty days before the date of the examination.

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**International Union Against Tuberculosis.** — The eighth conference of the International Union against Tuberculosis will be held at The Hague in September, 1932. Dr. David Stewart has been accepted as a co-reporter on the subject: "After care schemes for the tuberculous."

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**The Toronto Biochemical Society.**—The Annual General Meeting of the Toronto Biochemical Society was held in the Banting Institute on March 17, 1932. The Constitution for the Society, which was submitted by the Committee, was approved. Officers were elected as follows: *President*, C. H. Best; *Secretary*, E. J. King; *Treasurer*, P. J. Moloney; *Members of Committee*: L. Irving, C. S. Hanes, Miss A. C. Willard, H. D. Kay and V. E. Henderson.

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| | | Number of Cases Treated | Improved |
|---|---|---|---|
| I. | Amenorrhœa: | | |
| | 1. Primary | 8 | 1 |
| | 2. Secondary: | | |
| | (a) Oligomenorrhœa | 20 | 18 |
| | (b) Oligomenorrhœa (with lapses) | 14 | 12 |
| | (c) Regular (with lapses) | 19 | 11 |
| II. | Polymenorrhœa | 8 | 7 |
| III. | Dysmenorrhœa | 36 | 26 |
| IV. | Menopausal Symptoms | 18 | 14 |

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# Book Reviews

**Puerperal Infection.** James Robert Goodall, O.B.E., B.A., M.D., C.M., D.Sc., Clinical Professor of Gynæcology and Obstetrics, McGill University. 189 pages, illustrated. Price $3.00. Published at 1472 Sherbrooke St. West, Montreal, 1932.

This is a book of 189 pages, illustrated with line drawings and charts, on a subject of the greatest moment. Wherever statistics of maternal mortality have been recorded, puerperal infection has invariably headed the list of causes of death. Maternal mortality from this cause, important as it is, sinks into insignificance so far as the race is concerned, when compared with the tremendous morbidity. According to Dr. Goodall 97 per cent of patients affected with puerperal sepsis recover, but in many cases only to be burdened with long, or indeed permanent, invalidism.

The book is the product of twenty-eight years of clinical experience and of many years of teaching McGill students in the Royal Victoria and other Montreal hospitals. It was written firstly for final year students and was expanded to appeal to the general practitioner in particular, but the author modestly expresses in his introduction the hope that it will be not without interest and profit to the specialist also. The reviewer believes firmly that it should be read, and read with pleasure and profit, by every practitioner on whose shoulders rests the responsibility for the welfare of the expectant mother.

It is distinctly a personal book, based on the author's own experience and judgment. Some of his dicta may not be universally accepted, but a little discussion on an all important subject will not be amiss. Dr. Goodall exhibits the "angelic conjunction" of pathologist and clinician. The pathology of the various aspects under which puerperal infection parades is described with the greatest clearness. The multiplicity of metastasis that may result from an apparently slight injury of the birth canal is stressed.

Under treatment, the importance of seeking to attain to the perfection of technique of the abdominal surgeon is urged. According to the author there is no greater predisposing contributory factor to infection than a prolonged second stage of labour. As a preventive measure against hæmorrhage no treatment he states is so effective as blood transfusion. Dr. Goodall considers that surgery finds little scope in puerperal infections. Infections of lactating breasts are dealt with clearly. The book closes with a useful bibliography.

While a few errors in proof-reading have been noticed, these can be remedied in subsequent editions which should be called for. Dr. Goodall's book is distinctly worth while and can be recommended without hesitation.

**Diseases of the Coronary Arteries.** Don C. Sutton, M.S., M.D., Associate Professor of Medicine, Northwestern University and Harold Lueth, Ph.D., M.D., formerly Instructor in Physiology, Northwestern University, Chicago. 164 pages, illustrated. Price $6.00. C. V. Mosby Company, St. Louis; McAinsh & Co., Toronto, 1932.

The medical literature of late has abounded with articles on diseases of the coronary arteries, so that this monograph, consolidating present views and incorporating the ideas of the authors who have had a wealth of clinical experience combined with scientific experimentation, is most timely. The book is clearly written and well-illustrated, covering the subject in a concise and crisp manner, and on reading it one cannot but feel that there is much which is essential that has not been dealt with. In the introduction the authors state that "we have, essentially, accepted the thesis of Huchard, *i.e.*, that the cardiac symptoms of chronic cardiovascular disease are the products of arteriosclerosis of the heart, which is synonymous with chronic myocarditis. Such a concept explains the pathology and symptomatology as primarily due to an actual or relative obstruction to the flow of blood to the myocardium, and, secondarily, to those changes in the myocardium that occur as a result of decreased nutrition and anoxæmia". Unlike most books Chapter I deals with symptomatology, discussing briefly acute and chronic myocarditis, the respiratory symptoms, and the arrhythmias, and in more detail angina pectoris and coronary thrombosis. Chapter II discusses the physical examination of the arteriosclerotic heart.

In view of the fact that coronary artery disease is becoming more and more prevalent and that much has been written about it, this book summing up the subject to date is a worthy contribution to medical literature. While there is little in the book that has not appeared in the literature, such a review, separating the wheat from the chaff, makes easy reading for the busy practitioner.

**Some Factors in the Localization of Diseases in the Body.** Harold Burrows, C.B.E., F.R.C.S., Assistant at the Research Institute of Cancer Hospital (free), etc. 299 pages, price 15/- net. Baillière, Tindall & Cox, London, 1932.

This is an ambitious attempt to deal with one of the most interesting problems in medicine. The attempt, however, has failed to a most disappointing extent. The biological aspects of the behaviour of bacteria are almost ignored, although it is hard to see how they could have been taken up without producing a very large volume. The most one can say is that the book stimulates by its choice of subject, and nothing more.

**Clinical Interpretation of Laboratory Reports.** Albert S. Welch, A.B., M.D., Clinical Instructor in Medicine in the University of Kansas School of Medicine, etc. 366 pages, illustrated. Price $4.00. Philadelphia, P. Blakiston's Son & Co., 1932.

We are always looking for some book to help us in keeping up with the mechanical side of medicine. It is not likely that we will ever have a completely satisfactory one, but still some use may be made of those given us, such as the present work. It does not attempt to discuss all or indeed any of the laboratory tests in detail, and some of the comments show a rather hasty judgment. But for the man who is quite out of touch with laboratory and hospital work it may prove of some use. On the whole, it falls between the two stools of being either a mere index or a really full account of laboratory tests.

**Manipulative Surgery.** A. S. Blundell Bankhart, M.A., M.Ch., F.R.C.S., Orthopædic Surgeon to Middlesex Hospital, etc. 150 pages, illustrated. Price $2.50. Constable & Co., London; Macmillan Co. of Canada, Toronto, 1932.

The *raison d'etre* of this monograph, written especially for the general practitioner, is to give "an intelligible account of some of the uses and abuses" of this serviceable adjunct of surgical practice. Manipulation for various lesions has been made use of for many centuries, but only within comparatively recent years has it evolved from the realm of charlatanism and been placed on a scientific basis. The "bonesetter," with his small foundation of anatomical knowledge, wrought his so-called "miracles" by manual dexterity, while the chiropractor, nursing his fond delusions, made this method the backbone of his practice and his *pièce de résistance*.

Manipulative surgery is defined as "the art and practice of moving joints for therapeutic purposes," and is of value especially, in that "group of cases in which movement is limited by new fibrous tissue or adhesions formed in or around a joint or in the muscles." Mr. Bankhart has made a good presentation of this subject and has covered fully the field of application of these methods. One might express

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the opinion that there would be, in the hands of the inexperienced, some danger in performing manipulations such as he describes on certain joints which would be quite safe in the hands of an expert. Some of these dangers he points out. This book, the second of the "Modern Surgical Monographs," is well written and should be of much value to the general practitioner who often has to treat this class of difficult cases.

**Minor Surgery.** Lionel R. Fifield, F.R.C.S., Late Surgical First Assistant and Registrar, London Hospital. Second Edition revised by R. J. McNeill Love, M. S., F.R.C.S. VIII and 439 pages, illustrated. Price 12/6 net. H. K. Lewis & Co., London, 1931.

This compact and convenient little work is intended for students and practitioners, and exemplifies the practice of minor surgery as in vogue at the London Hospital. The book begins with a useful chapter on the examination of the patient, in which a few surgical affections of special regions are dealt with as examples of method. No attempt is made to deal with the subject exhaustively. Then follows a chapter on asepsis and antisepsis in which the virtues of the chief antiseptics used in connection with the sterilization of instruments, the preparation of the field of operation, and the treatment of wounds are set forth. The preparation of the patient before operation, some general points in connection with the operation itself, such as hæmorrhage, suturing, and drainage are dealt with. The greater part of the book is taken up with a consideration of the commoner surgical conditions that are likely to confront the practitioner, all of them dealt with in a direct lucid way, even if somewhat briefly. Wounds, injuries, hæmorrhages, cellulitis, minor operations, fractures, dislocations, fistula in ano, hæmorrhoids, genito-urinary emergencies, the eye and ear, bandaging, strapping, the whole concluded by a general disquisition on anæsthesia, both general and local.

The book strikes one as being thoroughly practical. It covers the ground efficiently within the limits set by its author. The illustrations are so numerous, and so well chosen that a lengthy text, indeed, is not required. The illustrations actually illustrate, and often point the way. We have nothing but praise for this excellent work.

**An Index of Prognosis and End Results of Treatment.** Edited by A. Rendle Short, M.B., M.S., B.Sc., F.R.C.S., Hon. Surgeon, Bristol Royal Infirmary. Fourth edition. 8vo. pp. xi and 599. Price $14.00. John Wright & Sons, Bristol; Macmillans, Toronto, 1932.

First appearing in 1915, this work has now reached its fourth edition and continues to fill its place as an aid to the practitioner in its field of prognosis in medicine and surgery. Anæsthetics, dermatology, gynæcology, obstetrics, laryngology, ophthalmology, mental disease, urology all find a place. There are many new contributors and many of the articles show thorough revision. Perhaps half of it is new. In ten years the literature of prognosis and end-results of treatment has grown, and, we believe, has added much to our knowledge of the value of various forms of treatment. This literature has been critically surveyed by the numerous contributors who have selected and compiled with judicial care from the statistical records and case reports. Where such records are not available the corps of collaborators have written as a rule from a rich personal experience.

The excellence of the former editions has not only been maintained but even surpassed. It presents to the practitioner fair opinions, founded on reason, and records of what may be expected from various methods of therapy, both as to relief of symptoms and cure of disease. The course of disease, whether influenced or uninfluenced by treatment, receives fair presentation. The work, well indexed, forms a ready reference volume for the practitioner, which will aid him in deciding upon treatment, and will allow him to discuss intelligently and wisely with the patient or his family the probable outcome in an individual case.

**Textbook of Medicine.** By various authors. Edited by J. J. Conybeare, M.C., M.D., F.R.C.P., Assistant Physician to Guy's Hospital. Second edition, 1004 pages, illustrated. Price $7.00. E. & S. Livingstone, Edinburgh; Macmillans, Toronto, 1932.

That a second edition is called for in three years is perhaps proof that this text-book has made a place for itself. In presenting the revision the editor makes the unusual announcement that with an increased number of pages the price is slightly reduced. His aim has been to provide the student and the practitioner the essentials of medicine in a book smaller than the general texts on medicine without descending to a synopsis. With the aid of his contributors, he has succeeded in achieving this desirable result. Several articles have been added, and some, notably the section on the blood and its diseases, have been extensively revised or rewritten. Though most of the contributors are English physicians, both India and South Africa are represented, and Trevor Owen, of Toronto, writes on diseases of the liver, gall bladder, pancreas and peritoneum. We would suggest that in a new edition the page be enlarged to lessen the thickness of the book. In its present form it is awkward to hold or even read on a table, difficult to keep open, and the inner margin of each page is too narrow for comfortable reading.

## BOOKS RECEIVED

**A Textbook of Bacteriology.** Kenneth L. Burdon, Sc.M., Ph.D., Instructor of Bacteriology, Immunology and Public Health, Washington University School of Medicine. 542 pages, illustrated. Pricee $3.30. Macmillan Co., New York and Toronto, 1932.

**Primary Carcinoma of the Lung.** B. M. Fried, M.D., Peter Bent Brigham Hospital, Boston, Mass. 247 pages, illustrated. Price $5.00. Williams & Wilkins, Baltimore, 1932.

**Microscopic Slide Precipitation Tests for Diagnosis and Exclusion of Syphilis.** B. S. Kline, M.D., Chief of Laboratories, Mt. Sinai Hospital, Cleveland. 99 pages, illustrated. Price $2.50. Williams & Wilkins, Baltimore, 1932.

**Medical Clinics of North America.** Vol. 15, no. 6, 300 pages, illustrated. Issued serially every other month. Price $18.00 (6 numbers). W. B. Saunders, London and Philadelphia; McAinsh & Co., Toronto, May, 1932.

**Manual of Clinical and Laboratory Technic.** Hiram B. Weiss, A.B., M.D., F.A.C.P., Associate Professor of Medicine, University of Cincinnati, and Raphael Isaacs, A.M., M.D., F.A.C.P., Associate Professor of Medicine, University of Michigan. Fourth edition reset. 117 pages. Price $1.75. W. B. Saunders, Philadelphia and London; McAinsh & Co., Toronto, 1932.

**Practical Treatment of Skin Diseases.** Eduard Ahlswede, M.D., New York and Hamburg. 770 pages, illustrated. Price $12.00. Paul B. Hoeber, Inc., New York, 1932.

**Surgery, with Special Reference to Podiatry.** Edward Adams, M.D., Professor of Surgery, First Institute of Podiatry of New York. 480 pages. Price $5.00. Published by International Journal of Surgery Co., New York, 1932.

**The Surgical Clinics of North America.** By leading surgeons. Vol. 12, no. 3. 300 pages, illustrated. Issued serially every other month. Price $18.00 (6 numbers). W. B. Saunders, London and Philadelphia; McAinsh & Co., Toronto, June, 1932.